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THE ECONOMIC JOURNAL

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RECENT THEORIES CONCERNING THE NATURE AND ROLE OF INTEREST[1]

PREFACE

THE place of interest rates in the economic process has since 1945 been mainly discussed, within the literature in English, along three lines: first, criticism and defence of Keynes's position; secondly, advocacy of a stock or of a flow analysis, or of the need to combine them; thirdly, examination of the claim of interest to be a suitable and effective regulator of the pace of growth of the nation's wealth. The following survey tries to explain and criticise this debate and to interject some suggestions into it, without aiming at more than an illustrative coverage of the literature. It is earnestly hoped that the absence of a name from this article will not be taken to imply any judgment on the value and importance of any person's work.

PART I. THE NATURE OF INTEREST

I. TYPES OF ECONOMIC THEORY

When we have no theory about economic affairs, no state of those affairs and no temporal succession of states seems inconceivable. A theory restricts the conceivable states and successions of states to those in which the relations between quantifiable things in the economy conform to some specified rules. Theories differ from each other in the list of quantifiable (not necessarily measurable) things to be considered, and in the precise character of the rules about their interrelations. This meaning of "economic theory" leaves unlimited the number of different theory-classifying schemes we can set up. But in historical fact the cleavages between groups of theories have run along a few clear lines, which can for practical purposes be easily defined. These lines, of course, intersect each other and yield cross-classifications.

One dichotomy is between *equilibrium* and *development* theories. Equilibrium is a test that selects for the economist one particular situation out of an infinity of situations and justifies his calling attention to it as something special. Judged by the smallness of the ratio of what it accepts to what it

[1] This is the third of the series of special articles, referred to in the issue of June 1960, designed to give a summary of recent developments in economic theory and supported by the Rockefeller Foundation.

rejects, no other test seems able to rival its selective power. No other test, it may also be claimed, can state so sharply in what the accepted differs from the rejected situations. By contrast, no test of comparable power and conviction can be found for selecting among paths of development. On the most general grounds, equilibrium has great claims as an economiser of thought. To dispense with it has meant, in practice, to be reduced to mere factual enumeration. For ninety years few economists, save the German historical school, have based their theories upon any other principle. Even those most anxious to disparage it as a *description of what is* and, still more, of what ought to be, have nonetheless needed it as a means of understanding and of accounting for what is. Even Keynes's *General Theory of Employment, Interest and Money* [1], so strongly repudiating some of the conclusions of equilibrium theories, was itself an equilibrium theory in its method.

Theories may secondly be distinguished according to the mode of choice which faces their acting subjects. When a theory supposes the available alternatives to be perfectly known to these subjects in every respect which concerns them, I shall speak of a theory of *pure* choice. Under any other assumption the acting subject has, with greater or less freedom, to create his own list of alternatives before he can choose among them. If the alternatives are not *given* to him, or in so far as they are not given, he must necessarily produce them by his own thought, judgment and imagination. Choice of this two-stage kind I shall call *impure* choice.

A subject facing pure choice has no motive for not dealing at once with every question that arises concerning the details of the action he shall adopt. For he knows everything about the consequences of every available act. But a subject facing impure choice may elect a " simple " immediate act designed to secure freedom of deferred choice among more specialised alternatives. In fact, rather than decide what to buy, he may elect to retain money. In theories of pure choice there is thus room for money only as a unit of account and none for money as a store of value, an *asset*. But all the interesting properties of money arise from its use as an asset. Thus theories of pure choice are " non-monetary " theories.

Finally, we must make a subdivision within the equilibrium method. For this method can, paradoxically, be concerned either with *events* or with *states*. *Long-period* equilibrium is, of course, a state, and its meaning may even excuse us from asking whether it would, given stability of all the " non-economic governing conditions," eventually be attained or not. There are degrees of strictness with which long-period equilibrium may be interpreted. We may mean by it the perfect and complete adjustment of everything in the economy to everything else, a general equilibrium attained after no matter how long a time. Or we may have in mind a period sufficient for some particular impulse (such as an increase in the money-stock) to have worked itself out through the system as it exists, even though that system itself may not be in complete long-period internal adjustment. Let us call

this a " middle-period " equilibrium. Middle-period equilibrium is also, then, essentially a means of studying states.

When we seek to determine a state of affairs in which, if the economy ever arrived at that state, it could remain at rest, because this state is one of long-period general equilibrium, we are not concerned with the path from the existing to that ultimate state, we are not interested in the *event* or chain of events carrying the economy from one situation to the other. But in the short period the temporary and partial equilibrium, which defines as it were a gravitational force acting on the economy, serves rather to describe an event than a state. It answers the question " What will happen next to the economy? " The two meanings of equilibrium are thus rather sharply contrasted in regard to the part they play in analysis. In its short-period connotation, equilibrium can enable a dynamic tale to be told in static language.

II. Keynes and the Classics

If we have spent some time preparing the foregoing classificatory scheme, our reason is that theories can appear to be widely divergent and contradictory, while in fact, because they are answering different questions, they are perfectly harmonious. An example is provided by the first source we shall consider. Professor Patinkin [2] finds Keynes's interest theory wrong on almost all counts. In this criticism, however, Patinkin is setting a long-period equilibrium analysis of almost pure choice, which therefore is in vital respects non-monetary, against Keynes's short-period equilibrium analysis of impure choice treating money in its full-blooded sense. No reader of Keynes's article " The General Theory of Employment " [3], published in February 1937 in answer to critics, will be in doubt that Keynes looking back saw as the main theme of his book the commanding importance of uncertainty and of the conventions by which the insoluble problems it poses, and the nonsense it makes of pure " rational calculation," can be shelved in order to make life possible at all. Professor Patinkin, by contrast, says: " the limited objective of this [Patinkin's] book . . . is to understand the functioning of a money economy under perfect interest and price certainty." And a little earlier: " Once the Pandora box of expectations and interest and price uncertainty is opened upon the world of economic analysis, anything can happen." Patinkin's analysis, worked out with watch-like precision, is concerned with money as a means, merely, of meeting random demands for payment, and not as a means of speculation or of deferring specialised decisions.

Patinkin, then, quite excludes those Bulls and Bears who would otherwise smash up the china shop of rational economics. They are, to a degree which Patinkin, despite an incomparable scrupulousness towards his reader, does not perhaps sufficiently make clear, the heart of Keynes's liquidity pre-

ference theory. Once the transactions motive is satisfied, all the rest of the existing money must be held by Bears (or at least, non-Bulls), of whom there have got to be enough for this purpose. The business of the interest rate, *qua* equilibrator of liquidity preference, is to move to such a level as will create these necessary Bears, or eliminate some of them if there are too many. Nor are we, in this dynamic world of speculation, free to think of the speculative demand for money as depending solely on the *level* of the interest rate. At any moment this demand may be powerfully influenced by the most recent *movement* of the interest rate, its extent and speed. We may go farther. People who are holding money because they think the interest rate will rise may decide to hold it no longer if they observe the interest rate to remain where it is. For at a constant interest rate (that is, constant prices of bonds) they are missing an income (namely receipt of interest) which they could have with no offsetting capital loss. Thus if the constancy of the interest rate has been due to a force of non-Bulls just brought to sufficiency by the presence in it of some Bears who count on a rising rate, this constancy will soon destroy itself by disillusioning these Bears, who will buy bonds, and cause the rate to fall. Interest may be *inherently restless*. All this is outside the limits of Professor Patinkin's concerns. It is, indeed, beyond the range of the equilibrium method.

His main contention is a simple and compelling one. Money's usefulness, no matter in what context, derives ultimately from its exchangeability for goods (including factors of production) of those kinds which are wanted for their own sake or for their *technical* transformability into goods wanted for their own sake. Money by definition cannot be enjoyed, consumed or made a physical tool of, it can, ultimately, only be exchanged. It can be stored, but even then only with a view to its being in the end, at some time or other, exchanged. It can be lent, but only with the result of promising more money later on, which money will then be serviceable only by being exchanged. If you are holding money with a view to paying for things the quantity of money you need depends on the prices of the things you have contracted to pay for. The marginal utility of a given stock of money thus depends on the price level. This is true whatever the *proximate* motive for holding the money, whether it be to bridge the unforeseeable time-gap between receipts and spendings or to make the time-shape of spending different from the time-shape of income by the issue or purchase of bonds, or even (so Patinkin says, and here we are not quite so readily convinced) to make a capital gain in the bond market.

If, by government decree, the British unit of currency were altered overnight from the pound to the florin, everyone whose bank had owed him £100 would now owe him 1,000 florins. Everyone who had owed his tailor £20 would now owe him 200 florins. Everyone who had yesterday purchased a bond for £1,000 due to be redeemed in one year's time for £1,050, would now own a bond due to be redeemed in one year's time for 10,500 florins.

If, in the familiar way, tastes, techniques and real resources were the same to-day as yesterday, nothing that mattered to anyone would have changed. In France the transition to the " new franc " is almost an example, in reverse, of the very thing we have supposed. Why, in either of these cases, should the interest rate change? There is no reason.

Change of the currency unit and re-expression of all prices, debts and money stocks in terms of the new unit is, in comparative statics terms, the same thing as a change in the quantity of *each person's* money and of all prices, all incomes and all debts in one and the same proportion. Can it be claimed that this is what an increase in the total money stock will in the long-period achieve? If all prices and wages were flexible; if the extra money were introduced in such a manner that everybody's holdings (positive or negative) of bonds and holdings of money were increased in one and the same proportion; if expectations were inelastic; if there were nowhere any money illusion (no tendency to regard a ten-shilling note as something in itself and not merely as ten shillings' worth of purchasing power at the prices happening at any moment to prevail); then an increase in the economy's total stock of money would leave the rate of interest unchanged for the same reason that a change in the currency unit would do so. Professor Patinkin is scrupulous to point out how far from practical reality some of these necessary conditions are. But he does believe that those which are least easily accepted are also the least harmful to the long-period neutrality of money. Equi-proportionate changes in every item of a list in which every individual's money holding is an item, his bond holding is an item and his debt on bonds he has issued is an item are wildly unlikely; but if tastes are not too dissimilar this may not make much difference. Elastic expectations he dismisses as incompatible with meaningful economic analysis. And as to absence of money illusion, he seems to be in two minds whether to make it an assumption or to claim it as a consequence of rationality.

Many who have spoken of money as a veil have failed to make explicit the conditions on which this neutrality will be achieved, and have not, in particular, insisted that money balances as well as money incomes must be supposed to be multiplied by the same factor as prices. Turning this necessary condition round, Patinkin shows that money balances cannot be increased without bringing into play forces, of that utterly familiar kind consisting in the observance of the equi-marginal utility principle, which will in the long run, and unless obstructed by law or human perversity, push prices up in the same proportion as the balances have been increased. These forces will at the same time, given this price flexibility, cause the quantities of bonds issued and held by firms and individuals to be increased in yet again this same proportion. All these consequences together constitute what he calls the " real balance effect." Time will, indeed, be needed for all these changes to work themselves out through the system, and while they are doing so the rate of interest will be lower than before. But when

they have done so, an increase in the stock of money will, as Ricardo [4] and Wicksell [5] said, leave the interest rate unchanged.

Keynes must be supposed, according to Patinkin, to have thought that an increase in the stock of money would permanently over-satisfy liquidity preference at the former interest rate, and would therefore lower the rate to that level where the increased transactions balances required by the increased general output or the higher prices (or both) due to the increased investment flow at the lower interest rate would soak up such of the extra money as was not wanted by the lower rate's newly created Bears. How could he believe this? By believing that asset holders as well as wage-earners were money illusioned. We may well think it natural for those who had experienced the gentle deflation of 1920–35 to be very differently conditioned towards money from those who, in 1956, had suffered fifteen years of continuous quite rapid *in*flation. Circumstances alter cases. But there is more than this. Keynes saw economic life as made up of events and not of states. His method only was an equilibrium one, the picture he sought to explain was of booms and depressions, inflations and crises, continual challenge and and change. " Equilibrium is blither " he (orally) said.

Patinkin draws from his model the following conclusions on interest:

(i) In a world where each individual feels certain that he knows, for each future date within his horizon, what interest rate, what price of each good and what level of his own income will prevail (that is, a world of " interest, price and income certainty "), a greater than zero interest rate could exist, and would be accounted for by the desire of people to consume according to a different time-shape from their incomes, and by the desire of entrepreneurs to make profits by investing in equipment. [We may note that a world of " interest, price and income certainty " is by no means the same as a world of perfect foresight. In Patinkin's model expectations are held with certainty, but are in general not correct.] Not only does interest belong to a world of certainty as well as to one of uncertainty, but " a proper approach to interest differentials begins in the classical manner with the determination of the rate on long-term bonds by the basic forces of thrift and productivity, and goes down from this rate to the shorter-term ones." [The latter part of this sentence is disturbing to a reader who is basically willing to see in Patinkin's work, not a competitor to the liquidity preference or Bulls and Bears theory, but a solution of a quite different problem. That problem is indeed the " long-period " one. But what has this to do with " long-term bonds "? They are the objects of day-to-day and hour-to-hour speculation like any Stock Exchange security.]

(ii) The threefold role of the interest rate is to equalise for every individual (in his private or his entrepreneurial capacity) the utility of consuming a marginal amount now with the utility of having the pros-

pect of consuming the compound-interest-increased equivalent of this amount in the future; to equalise for him the utility which his marginal unit of money holdings affords by its liquidity with the utility which a bond, purchased with it, would afford by promising interest; and to equalise for him the interest he could obtain (or avoid paying) on the marginal bond with the rate of profit promised by the equipment purchasable with the price of this bond. This "threefold margin" was so named by Sir Dennis Robertson [6].

(iii) An increase in the economy's total money stock does not inevitably or essentially entail a change in the long-period equilibrium rate of interest. Any such change will arise from the special *distribution* of the extra money, and not from its coming into existence. To believe otherwise it is necessary to believe in money illusion on the part of asset owners.

(iv) "The amount of money demanded depends upon the rate of interest, the rate of interest does not depend upon the amount of money." This merely means that the rate of interest does not depend only on the amount of money but also, among other things, on prices, which when time has been given following an increase in the economy's stock of money, will increase in the same proportion as the stock, thus leaving the "real" situation and the equilibrium rate of interest unchanged. When we add that the amount of money demanded also depends on prices as well as interest, the paradox vanishes.

The facts support Professor Patinkin in his chosen context. Huge increases in the British quantity of money have been accompanied over the past twenty years, not by a fall but a rise in the long-term and, far more dramatically, in the short-term interest rates. But this long period context is nothing that Keynes ever had in mind.

In his review article in the ECONOMIC JOURNAL [7], Professor Hicks applies his incisive diagrammatic tests to reach much the same understanding of Professor Patinkin's book as our broader approach above has led us to. That book is concerned, Professor Hicks says, with "full equilibrium" (this appears to us identical with "long-period" equilibrium). Full or long-period equilibrium assumes that money wages, along with all other prices, are perfectly flexible downwards as well as upwards. (The question whether this flexibility requires time or not is, let us interject, inapplicable to long-period equilibrium, for whose purposes time is not scarce.) It is in assuming this downward flexibility that the full equilibrium theory, which is the "classical" theory as Keynes meant that term, differs from Keynes's theory, whose primary assumption (realistic for the 1930s but not for the early nineteenth century) is that the money wage is given and, for institutional reasons, will not fall and, for reasons of abundant unemployed resources, will not rise as employment changes. With perfect upward and downward

wage flexibility, Professor Hicks shows that real income (measured in wage units) can stand at one level, and one only, given the community's income-and-consumption schedule, the marginal efficiency of capital, the quantity of money and the absence of any speculative motive for holding money. For only at one level of real income will the amount that people wish to save out of that income be equal to the investment which, given the interest rate corresponding to the given quantity of money *and that level of real income*, the entrepreneurs are willing to do. If the entrepreneurs, all taken together, tried to have a larger investment flow than this the result would be a rise of prices and money wages without any increase of employment or output, for the unique real-income point is a point both of full employment and "full unemployment." This rise in prices, in face of the fixed quantity of money, would shift the income–interest-rate schedule towards the interest-rate axis, and thus, by raising the interest rate corresponding to a given real income, drive investment down to its former level. Similarly, a too-small investment flow would lower wages and prices and reduce the interest rate corresponding to any given real income, and so push investment and income back to their former levels. In this model it is the "real" factors of productivity and thrift which determine the interest rate. If thrift were weaker the "saving gap" between production (that is, income) and consumption would be smaller, a smaller investment flow would suffice to fill it, this small investment flow (given the schedule of the marginal efficiency of capital) could be induced by a higher interest rate and prices, given the quantity of money, would adjust themselves upwards so that this quantity of money only just sufficed for the transactions and precautions needs at this higher interest rate. Or if the marginal efficiency schedule (productivity of capital) were to shift, again a different interest rate would arise just sufficient to induce the investment necessary to fill but not over-fill the saving gap. In this model it is the level of money prices and so, given real income, the level of money income, which is altered if the quantity of money is altered. In terms of Dr. Hahn's [8] analysis, which we shall discuss below, the classical full-equilibrium economy was effectively "decomposed" into two independent sub-systems, the "real" system, which determined *everything* "real," including the rate of exchange between present and future goods, and the "money" system, which determined only the arbitrary monetary name (measure) of the real income, *etcetera*, determined elsewhere, which it was powerless to influence in any other respect.

In pointing to the absence of downward flexibility of wages as the essential difference between the full-equilibrium model and Keynes's model, Hicks neglects in the early part of his discussion, as Patinkin does throughout, a feature which is even more characteristically Keynesian, namely, the speculative motive for liquidity. For in this neglect there is involved, given the de-natured marginal efficiency schedule which in the full-equilibrium model is no more than a physical productivity schedule, the neglect of the

whole matter of uncertainty of expectation. Hicks does insist, however, on the third vital difference between Keynes and all the classics, including Patinkin: the classics were concerned with the full long period, which is the same as to say, with full flexibility. Keynes was concerned with the short period, in which some things are stickier than others.

Quite at the end of his article (superb in its clarity and penetration) Hicks brings up reluctantly the speculative motive like a shameful atom bomb to settle the matter. He has shown that the question whether unemployment can be cured by monetary expansion turns on whether we assume full flexibility of the interest rate so that it can fall to whatever level may be needed for the stimulation of a full-employment-giving level of investment, or whether we assume that there is a "floor" to the interest rate, below which it cannot be forced by any ordinary expansion of the money stock:

> "In order to show that we get a better understanding of these problems by considering effects [of shifts of the marginal efficiency schedule or the income-consumption schedule G.L.S.S.] on employment and income first, and then correcting by possible repercussions through interest, all that is necessary is to maintain that there are ranges over which the repercussions through interest will be rather insignificant. To do that no more is necessary than to emphasise the ability of speculative funds to stabilise the rate of interest against considerable disturbances. Which is effectively what Keynes did."

To treat the transactions motive as central and the speculative motive as incidental or peripheral is as though an oceanographer should study the inflow from rivers but neglect the tide. Professor Hicks has, however, preferred to defend Keynes with classical and not with Keynesian weapons, for even he, it seems, is not willing to give Keynes full applause for his great *tour de force*: the writing of *earthquake economics* within a framework of comparative statics. One more remark seems here permissible. The theory against which Keynes has to be defended is the classical theory, which shows interest to be determined by the "real forces," productivity and thrift. That theory also shows that there can be no such thing as unemployment. It was this sort of approach which, seen from the standpoint, say, of 1933, aroused his formidable contempt.

Professor Patinkin's "Rejoinder" [8] to Professor Hicks was concerned only with insisting again on the "real balance" or "Pigou" effect, whereby, it is claimed, a fall of prices, by increasing the purchasing power of people's stocks of money, will induce them to spend more [when? over how long a period? in how thin a lifelong trickle? or (abandoning Patinkin's unswerving assumption of "rationality") in how disturbing a burst of extravagance?] on commodities. The question in this regard is whether people who are saving out of income take *income* or *assets* as the proper measure of the basis of their spending power. But this whole question and

Patinkin's Rejoinder bear on the theory of employment rather than on that of interest.

The classical case is the long-period case. In terms of comparative statics we ideally compare, not the states of one economy at two different dates, however remote from each other in time, since then one state must precede and "lead to" the other, and we are always tempted to ask about "flexibility" and other things strictly irrelevant; but we compare two structurally identical and atemporal economies (with tastes, techniques and nearly all resources identical between the two) in one of which the quantity of money, say, is larger than in the other; and we observe what other things must then also be different.

The same "classical" conclusions for the long-period (or as we should say, atemporal) case, at which Professor Hicks arrives diagrammatically, had been put forward in 1944 by Dr. Franco Modigliani [9] in an argument which, however, Dr. F. H. Hahn in 1955 [10] found self-contradictory. Dr. Hahn reports as follows Modigliani's conclusions:

> "if the supply function of labour is homogeneous of degree zero in all prices including money wages [that is, if equi-proportionate changes in all prices leave unchanged the quantity of labour supplied], then
>
> "(i) the rate of interest is determined by investment and savings [saving?] and
>
> "(ii) liquidity preference determines the level of prices and *not* the rate of interest."

If, says Dr. Hahn in effect, the "real" variables (that is, relative prices, the rate of interest and the size of the general output of all goods together) form a self-contained system sufficient to determine all its own variables and impervious to any and all other influences, while the quantity of money and the level of absolute (*i.e.*, money) prices form a separate and independently self-determining system, then, if we reject Say's Law, we might have a situation where the "real" system was in disequilibrium, with total demand for commodities exceeding total supply, and yet where the "money" system was in equilibrium, with the demand for and supply of money equal to each other. But this, says Dr. Hahn, would contradict Walras's Law, according to which the total demand for all goods, *including money*, cannot fail to be (is identically) equal to the total supply, since "all goods" includes everything in terms of which demand can be exercised and likewise everything comprised in "supply." However, if we assume Say's Law, that is, *identical* (unconditional and logically inevitable) equality between total demand and total supply of all goods *other than* money, then by Walras's Law there must also be identical equality between the quantity demanded and the quantity supplied of money, so that, since this equality holds regardless of any change in the size of the money stock (the supply of money), no such change can serve to determine the absolute price level; there is no

need for any particular price level to equalise the demand for and the supply of money. By this dilemma, between a contradiction if we reject Say's Law and the indeterminacy of absolute (that is, money) prices if we accept Say's Law, Dr. Hahn holds Modigliani's argument condemned.

We think that in this part of a highly ingenious article Dr. Hahn is oversubtle. No doubt it is true that unless *both* systems, real and monetary, are in equilibrium, both must be in disequilibrium: there must be excess demand in both (numerically equal and of opposite sign) or in neither; but when the " real " system is in equilibrium, this equilibrium includes a determinate interest rate, to which the given *nominal* money stock must accommodate itself by appropriate change of the absolute price level and so of the real purchasing power represented by the given nominal money stock. There is, we are assuming, equilibrium in the " real " system and so, by Walras's Law, there must be equilibrium in the money system; and this latter equilibrium can be attained because by assumption changes of the price *level* do not disturb the equilibrium of the real system.

This is the escape from Dr. Hahn's two-pronged fork, if we are prepared to reject Say's Law; and surely Say's Law, true in a *non-monetary* economy, can find no logical basis in an economy which uses money. If goods are in fact bought and sold for money, and a money stock exists in the economy, it seems plain that money can be withdrawn from the stock and used on the commodity market, thus upsetting Say's Law. But suppose, against all reason, we insist on believing in Say's Law in the " real " part of a money economy? Then surely we must ask for a *complete* money economy. What is wrong with Dr. Modigliani's model is that it makes no mention of bonds. How can money be lent except in exchange for bonds? If, then, the money system in Dr. Modigliani's model comprises money *and bonds* it can obey a " Say's Law " of its own in the sense that the total demand and supply of monetary assets (money *and* bonds) must be identically equal, and still determine the interest rate by an equilibrium money price of bonds.

Dismissing theories which make interest to depend only on productivity and thrift, or on the *ex ante* equality of saving and investment, because such theories take no account of people's decisions what to do with their accumulations of *past* saving, which exist at all moments in various forms exchangeable for each other at prices which express the interest rate, Dr. Hahn turns to theories which do concern themselves with the prices of *old*, as well as those of *new*, bonds. These other theories are, first, the loanable-funds theory, which says that the interest rate will change unless the excess demand for bonds is zero, and secondly, the liquidity preference theory, which some have interpreted as saying that the interest rate will change unless the excess demand for money is zero. Dr. Hahn, however, rejects this latter interpretation. For people can add to their money balances by supplying, in any interval, productive services in excess of the value of goods they demand for consumption in that interval. But Keynes explained that liquidity

preference enters only at the second of two decision-stages involved in the satisfaction of people's time-preferences. At the first of these stages the individual must decide how much of his income to consume or how much to save, and here there is no question of liquidity preference. At the second stage, however, he must decide in what kind of assets he shall hold the results of saving, and here alone liquidity preference is involved. A theory which says that the interest rate is what equilibrates the demand and supply of money can, therefore, in particular circumstances imply that the interest rate equilibrates *reluctance to save* with desire for liquidity. The next step of Dr. Hahn's reasoning from this consideration is not quite easy to follow. For he is not satisfied simply to accept the consideration as a necessary consequence of discussing the interest rate in terms of a model of general interdependence. On these latter lines we might be inclined to dismiss this objection against regarding the interest rate as the price which eliminates an excess demand for money. For on what *general* ground can we elect the rate of exchange between one pair of mutually exchangeable things as worthy of attention and ignore that between another pair? Sir Dennis Robertson's threefold frontier between consumption, the purchase of earning assets and the accumulation of liquid ones, and indeed the general interdependence conception as a whole, require us to look upon the desire to consume, and the desire to accumulate liquid assets, as possible direct rivals of each other. In particular circumstances the motive to save may be the desire not for wealth in general but for the security or manœuvring power conferred by *liquid* wealth. I may be willing to forgo wine for a year in order to have one hundred pounds in the bank, but not in order to pay off one-tenth of my mortgage debt. Apparently accepting such a view, Dr. Hahn nevertheless argues that " liquidity preference must be taken as determining the *ratio* (' form ') in which assets are demanded, and *not* the total quantity of assets demanded or supplied "[10]. The argument which he builds on this leads us, by an interesting fresh route, to that question and difficulty which in my own view are the supreme enigma of interest theory and the real source of all its troubles.

Let us suppose, then, (Dr. Hahn says), that at some date *ex ante* saving is less than *ex ante* investment, and that accordingly there is an excess supply[1] of bonds. Suppose also that the *ratio* in which money and bonds are demanded is the same as that in which they are supplied. In this case the loanable-funds theory predicts a rise in the interest rate, but Dr. Hahn's interpretation of the liquidity preference theory predicts no change in the interest rate. Dr. Hahn none the less reconciles the two theories. Excess demand equations, he says, are to be understood as holding *ex ante*; that is to say, the equality of the two sides is looked to be attained at the end of some still-future " planning period " (which we may distinguish as the investment planning period). His model assumes that investment plans are (objec-

[1] By a slip Dr. Hahn's article refers to an excess *demand* for bonds.

tively; presumably within the knowledge of some super-human observer) certain to be fulfilled. This in turn implies that investors will during the (investment) planning period obtain the necessary finance. Thus within that period two transactions must take place: first, bonds must be sold for money, and then this money must be used to buy investment goods (machines, etc.). Extending from the investor's " present " to some interior date of the investment planning period, therefore, there is a second and shorter period which we might call the finance planning period. There are in fact two planning periods, a shorter one concerned with obtaining finance and a longer one concerned with using it. Corresponding to *each* of these there is a pair of ratios, the ratio in which money and bonds are demanded and the ratio in which they are supplied. Between the members of one of these pairs (in particular, the one referring to the end of the investment planning period) there can be equality notwithstanding that between the members of the other pair there is inequality, an inequality caused by the intending investors' temporary need to accumulate funds ready to spend on investment goods. As soon as this spending actually takes place the equilibrium of the investment planning period will re-assert itself over the disequilibirum of the finance planning period. Both theories are right: the loanable funds theory, which says that there will be disequilibrium in the finance planning period, and the liquidity preference theory, which says that there will be equilibrium in the investment planning period (in the circumstances assumed, viz., a ratio between the supply of money and that of bonds which is correct provided demand is not distorted by the need for " finance " for investment schemes).

If, in thus reconstructing Dr. Hahn's argument, I have preserved its essence, we have, I think, to recognise two very important questions which it raises. The first is whether it is useful or appropriate to think of finance and investment not merely as distinct stages in each separate equipment-augmenting operation by each individual business-man but also as *observable* stages in the economy's aggregate flow of equipment augmentation. For surely the release of finance which occurs when one firm spends its hoard can supply the need of another firm to build up its hoard? To say this is not in the least to deny that when a *given* aggregate national income contains a large investment component there may be required a different ratio of money to bonds from what is required when the income consists wholly of consumption. For when all transactions are small no marshalling of great sums may be needed. It will also be true that when the investment flow is planned to increase the interest rate will tend to rise because the necessary extra finance will have first to be marshalled and then later released. But, secondly, a much more interesting and radical difficulty confronts us. The length, in calendar terms, of the planning periods is not a matter of indifference, for the relative quantities of new and old bonds offered for sale during such a period will depend on it. More fundamentally, what is the meaning,

in the theory, of the length of the planning period and what determines it? These questions raise a basic theoretical and methodological issue, that of the co-existence in some markets, and pre-eminently in the bond market, of two separate possible equilibria, an equilibrium of stocks and an equilibrium of flows, and that of the relation between these two and the question whether one or other is dominant or by what process they influence each other and can both be satisfied at once.

III. Stock Analysis or Flow Analysis?

An essential step towards answering these questions resulted from a debate in 1950 among Professors Klein [11, 13], Fellner and Somers [12, 15] and Brunner [14]. Klein sought to show that Fellner and Somers in an earlier article [16] had been wrong to treat stock analysis and flow analysis in monetary interest theory as equivalent. He asked whether they deemed the interest rate to depend, in effect, on the whole history of the demand and supply relation for securities since time was, or only on that relation in some current period. They replied that if the whole history up to the beginning of the current period had resulted, at that beginning, in an equilibrium, then any divergence from equilibrium in the current period must result from the events of that period. This answer was rejected by Klein as question-begging. Karl Brunner, however, carried the whole matter forward by showing that if we opt for a stock rather than a flow theory, we have then to choose between a liquidity preference and a securities theory, and that different behaviour in the securities market is implied by these two theories.

Brunner considers first whether a stock or a flow theory is appropriate to the securities market. The contrast, we may interpolate, is between a market such as that for electricity or fresh milk, where what is demanded from moment to moment or from day to day must, in so far as demand is met, be produced from moment to moment or from day to day, and a market such as that for antique furniture, where supply is an existing and non-augmentable quantity existing at all times. The market for securities is evidently nearer to the antique furniture than the electricity end of the scale. Moreover, it is one where " the decision to hold the stock is continuously appraised in the light of current market situations." On the implied ground that the market is dominated by the effect of price changes in releasing a large volume of orders to sell *from stock* or to buy from stock, a volume which is large, that is to say, in relation to the orders which can arise from new issues, Professor Brunner simply declares that except in a stationary state where new issues are zero and where, accordingly, both stock equilibrium and flow equilibrium are achieved together, we shall find the " momentary " price to be determined by the stock relation. In the stationary state both stock and flow relations must be simultaneously

satisfied, since the stationary state is one where the stock relation is satisfied subject to a special condition, viz., that flows be zero. The non-stationary heading covers the case of stock equilibrium combined with flow disequilibrium and the case of stock disequilibrium combined with flow equilibrium.

It is not easy to tell from what Professor Brunner writes whether he regards the stationary state, with zero new issues of bonds per unit of time, as the only possible double equilibrium, that is, simultaneous equilibrium of both stock desired to be held with stock existing, and flow desired to be issued with flow desired to be absorbed. When I am in a moving vehicle I am at each instant at some particular place (my "stock" situation) and moving at a certain speed (my "flow" situation). The combination of these two circumstances may be exactly what I desire for that instant. Were I not moving, I might wish to be in a different place; or were I at that instant in a different place I might desire to be moving at a different speed. Thus, it does not seem inconceivable that a particular stock of bonds and a particular pace of new issue of bonds may both be compatible with one and the same interest rate and that the combination of all three of these values of variables may satisfy everybody. In terms of our analogy, I may be moving, not because I would have preferred to be in a different place *at the given instant*, but because I aim to be in a different place at a later instant. In economic terms, wealth owners all taken together may be willing, at some particular interest rate, to increase their holding of bonds at just the pace at which borrowers wish, at that interest rate, to issue new bonds. I think that Professor Brunner does envisage this as a possible situation, since he seems in one passage to insist that, *even* in such a situation, the stock position is dominant. We must here interpolate a further passage of our own to ask whether in such a situation the stock position is indeed dominant.

The case for saying that wealth-owners' and income-earners' attitude to existing stocks of "old" bonds is dominant, as compared with would-be lenders' and borrowers' attitude to new issues, rests in our judgment on the idea that *the quantity released on to the market* (by any considerable change in the interest rate) of old bonds *could* be much larger than that of new issues. A trespasser hesitates to walk through the farm-yard at night, not because he is menaced by one dog awake, but because that dog may wake the whole hostile household. But whether this will be so or not depends on how sound the household sleeps; or in our own terms, on how sensitive bond-holders, actual or potential, are to changes of price. This sensitiveness in its turn depends, we now assert, on the *uncertainty* of their price expectations. For let us consider an economy where there are no new issues or fresh borrowing nor redemption of debt, but merely a constant stock of bonds. Let us suppose that each wealth owner has in mind some specific future date (not necessarily the same for everyone) which is the nearest he cares to look to for capital gain or loss, and that each has in mind a particular price of bonds, which price he treats as *certain* to be attained on that date. Then,

with due allowance for impending payments of coupon interest, any bond holder whose expected price is higher than the current market price will be willing to hold bonds, anyone whose expected price is below the current market price will be unwilling to hold them. Using the horizontal axis of a Cartesian diagram for numbers of bonds, and the vertical axis for bond prices, we could draw a curve connecting with each present market bond price the number of bonds which, with a given set of bond price expectations (one price for each person), wealth owners would be willing to hold at that price. It would, of course, be downward sloping towards the right, since in order to find additional willing holders of bonds we should have to lower the present market price so that it sank below the expected prices of a further section of wealth owners, or in market terminology, so that it turned some more Bears into Bulls.

Now unless this curve had some actually horizontal segments, any change in the existing quantity of bonds would, so long as expectations of bond prices remained unchanged, require some change of the interest rate (that is, of the current market price of bonds). If expectations of all actual or potential bond-holders, or of all those within some range of expected bond prices, changed, the "shape and position" of the curve would change bodily, and again there would have to be some change of the current market price of bonds; that is, of the interest rate. But now let us suppose that instead of each wealth owner entertaining with certainty a unique expected bond price, he had in mind a range of prices, all of which he regarded as possible. It might then be a reasonable first-approximation hypothesis that a bond-holder would not wish to be rid of his bonds in exchange for money unless the current market price rose above the upper limit of his range of (subjectively) possible future prices, and would not wish to acquire more bonds in exchange for money unless the current market price fell below the lower limit of the range. This supposition would require us to draw two curves, one showing, for each hypothetical existing number of bonds, the price above which the current market price must not rise if that number of bonds is to find willing holders, the other showing, for each hypothetical size of the stock of bonds existing, the price below which the current market price must not fall if that number of bonds is not to fall short of the desired number. In this case the number of bonds existing could be changed within some range without necessitating a change in the interest rate (see Fig. 1 (*a*)) or expectations could change to some extent without necessitating such a change (see Fig. 1 (*b*)).

Let us turn to a more formal aspect of the determination of price in a market which can be supplied from an existing stock as well as from new production. Suppose that output of the good in question, measured as so-and-so many units of the good per unit of time, can be at all times differentiated with respect to time so that, in ordinary language, changes in its size are "smooth" and do not include jump-discontinuities. Then the quantity

FIG 1 (b)

Curves 1 and 2: higher range of bond prices compatible with given bond stock.
Curves 2 and 3: lower range of bond prices compatible with given bond stock.

FIG 1 (a)

Curve 1: each ordinate shows highest bond price which will limit desired stock of bonds to that represented by the abscissa.
Curve 2: each ordinate shows lowest bond price which will make desired stock of bonds not less than that represented by the abscissa.

of the good coming on to the market from new production will, *in zero time at any instant*, be zero. Since in a market supplied *only* from new production we can suppose demand also to vanish to the same order as supply, when shorter and shorter intervals tending to zero were considered, a balance between demand and supply in every interval can be conceived, and we can perhaps further, with some artificiality, suppose such an equality *at all moments* between the demand-flow and the supply-flow to be brought about by price changes. But supply *from pre-existing stock* can be of finite amount in a zero interval of time. It is this circumstance which, in the less extreme form which it would take in reality, where flows are not " smooth " in the sense we have assumed, compels us to say that at any instant the price in such a market is dominated to some extent by the stock position. How great is this extent?

We know that except for some so-called " tap " issues of British Government securities, and any similar arrangements elsewhere, new bond issues do not conform to the smooth-stream model, but are made in large blocks by means of subscription lists which remain open for a few days, hours or minutes. There is thus much more in common between the mechanism and market impact of a new issue and that of a sale of a block of existing (" old ") securities than the extreme analogy of electricity versus antique furniture would suggest. It thus appears that the most convenient way of combining the two sources of supply in one analysis is simply to regard the interest rate, in the way we were doing a few pages earlier, as the price which must stand at or move to that level at which all existing bonds, no matter whether they have existed for a century or have only this moment been put upon the market, can find willing holders. A new issue is thus incorporated into the analysis, not as something separate which influence matters *qua* " flow," but simply as what brings about a change in stocks and requires additional willing bond-holders to be found.

This leads to one final aspect of our interpolation. An equilibrium in the bond market may be looked on as having, possibly, two stages. There may at some instant, and some interest rate, be equality between the number of bonds requiring to be held and the number for which there exist willing holders. But the bonds existing may not be all in the hands of those willing to hold them. Thus sales must, or can, take place *at the current interest rate* (*i.e.*, bond price inverted) in order to bring about a complete matching of desired with actual individual holdings, this state of affairs being the second stage to which we referred above. It thus follows that the occurrence of bond sales and purchases is not an infallible sign of stock disequilibrium in the aggregative sense.

In the second part of his article Professor Brunner shows that even when we have accepted the appropriateness of a " stock " approach to the bond market, we have still to choose between a " liquidity " theory and a " securities " theory. The former declares that the rate of interest will

change unless the existing stock of *money* is equal to the desired stock of money; the latter declares that the rate of interest will change unless the existing stock of *bonds* is equal to the desired stock of bonds. Further, the liquidity theory makes the speed of change of the interest rate to depend on the size of the difference between the existing and the desired stock of money, while the securities theory makes the speed of change of interest to depend on the size of the difference between the existing and the desired stock of bonds. The securities theory embodies Professors Fellner and Somers's belief that " in a multidimensional system there are a great many factors which affect the interest rate. However, in *any* system, these factors can affect the market rate of interest only through their effect on the demand and supply of interest-bearing securities." One thing, it appears, Professors Fellner and Somers have overlooked, although it fits without difficulty into their formula just quoted. Anything which affects *equally and simultaneously* the stock of bonds desired and the stock existing, and which *also* at the same time has its own independent effect on the thoughts, feelings or mental attitudes which underly the desire for a given stock of bonds, so as to make this desire compatible with a different interest rate, can cause the rate to change *without* upsetting the equality of the desired and the existing stock of bonds. Indeed, what economist would not be willing to draw a diagram in which the demand and the supply curve of some commodity had each shifted in just such a way as to intersect at a different price but an unchanged quantity?

What thoughts, feelings or attitudes could change in such a way as to lead to such a shift? Professor Brunner's equations of the liquidity theory include among the independent variables, on which the speed of change of the interest rate might be supposed to depend, the speed of change of other prices in the system. We should ourselves prefer to say that the most relevant such influences are plainly *expectations* of price changes rather than observed, that is, *ex post* changes. Professor Brunner, however, does not refer, in his article, to expectations. In the specific mathematical form which Professor Brunner gives to it the securities theory gives no explicit place to the influence of any thoughts except those which can be resolved into functions of public *ex post* quantities.

The dilemma we found in Professor Brunner's article, which he himself seems to sweep aside, the dilemma that if there are two distinct mechanisms or sets of influences bearing on the interest rate, each by itself capable of attaining an equilibrium of its own, these two must in some way be mutually reconciled if they both bear on one and the same rate, may find a solution along lines which, for a different purpose, Mr. A. Llewellyn Wright [17] has most ingeniously suggested. The essence of Mr. Wright's proposal is that in an economy with *changing* income, and so with changing amounts per unit of time by which equipment and aggregate idle balances (" reserve," " speculative " or " pure liquidity " balances, as they might alternatively

be called) are being augmented, the requirement of equality between the number of dependent variables and the number of mutually independent equations (which equality Mr. Wright, reasonably as we think, seems still prepared to accept as the equivalent of determinateness in many circumstances) allows *two* interest rates to operate simultaneously and separately on the market, the essential explanation being that their respective levels control the speeds of growth, respectively, of the saving-investment flow and of the hoarding or dishoarding flow. This, if in presenting it I have properly interpreted Mr. Wright, seems a most fertile suggestion. It means that a person's or a firm's affairs can be in equilibrium even when, for example, he is paying one rate of interest to borrow money and receiving a different one for lending it, not essentially because of any differences in risk or other such circumstances, but because he thus achieves the desired changes in the respective speeds of growth of his accumulated stocks of assets of different kinds. He ought, according to static analysis, to borrow just so much at any time that the rate of interest he pays on his marginal borrowing equals the rate he receives on his marginal lending. In a dynamic system the loss he appears to suffer by this failure to observe an equi-marginal rule may be the price he pays for, or the loss which is compensated by, the desired changes between one period and the next of the amounts added per period to his stocks, respectively, of equipment and of money.

The foregoing is my own statement of what Mr. Wright's article suggests to me. He, at least, proposes that there are two interest rates differing in their role and in the influences determining them; differing, that is to say, more essentially than in merely being " short-term " and " long-term " rates, although they may fall under these respective headings. One of these rates, called the " money rate of interest," is determined on a market which is almost literally the money market: " It can be regarded as the average rate of interest charged on bank overdrafts in any period; or, better still, it can be regarded as the Bank Rate." The other, called the " investment rate of interest," is " the rate which rules in the investment market proper, the market where the demand for investible funds is brought into equality with the supply of investible funds." His purpose in distinguishing, even in fundamental theory, two interest rates is to find for his lagged Keynesian model an extra variable unencumbered by an extra equation, since he believes the model otherwise to be over-determinate. As to the fitness of his device for its purpose, we are bound to ask whether this is not an example of that very disaggregation which Mr. Wright in his article recognises as ineffective, and Professor Brian Tew [18] has put forward the objection which must occur to every reader: can we conceptually split the loan market into halves so independent of each other that we need not have any equation connecting the prices which reign in them? We think, nonetheless, that Mr. Wright's work may yet be found to bear usefully upon our own problem, which, if the rate of interest has really to equilibrate both

stock held with stock existing, and the *time-constricted* acts of offering bonds and money for mutual exchange, is also one of over-determinateness.

The problem of how "stock" influences and "flow" influences upon bond prices are related to each other can perhaps be put as follows. At any instant a stock of bonds exists. The change in the size of this stock in a short enough time interval is negligible, and thus, it appears, the bond price at any instant must be determined by those influences which make people willing or unwilling to hold a stock of bonds. Against this argument, however, the following may occur to us: in the market for such a good as electricity there is at no time any stock. The *quantity existing* at any instant is zero. Yet there is a price, validly looked upon as depending on the confrontation of supply conditions and demand conditions. Evidently a price can be determined by the comparison of the potential sizes of two flows, each depending on this price, which must be such as to equalise them. Yet is it not true that the quantity supplied in any interval tends to zero with that interval, just as the growth of a stock in some time interval becomes negligible if that interval is taken short enough? The answer plainly is, that when we are simply concerned with two flows, both the quantity supplied and the quantity demanded vanish to the same order, and thus, in a familiar way, we can think of the ratio of these two flows as remaining finite while we carry to the limit the shortening of the interval of measurement. In the measurement of a stock, of course, no time-interval is in any way relevant, and thus a flow which requires some finite lapse of time to be accumulated into some finite quantity cannot influence the size or price of a stock *at some instant*.

It is an argument of this sort which I take to underly Mr. R. W. Clower's [19] disposal of the problem:

> "The aggregate quantities of various assets existing in an economy in any given period of time are inherited from the past. These quantities can be altered only gradually as a result of future economy decisions, so that if we consider appropriately short time periods, current additions to (or depletions of) aggregate asset stocks can be ignored."

Mr. Clower's purpose is to show that productivity and thrift do play an essential role in the interest rate's historical course. By regarding the rate at any moment as depending purely on the stock situation at that moment, namely the size of the bond stock, the expectations of individuals about future bond prices, the current prices of other assets, Mr. Clower can maintain that new issues of bonds, and retirements of existing bonds, occurring to-day, do not affect the rate to-day, unless they alter expectations. But when we look at two dates separated in time, the interest rate at the later date will be what it proves to be partly because of the change in size of the bond stock which new issues and retirements in the interval have brought about. The time rate at which such new issues and retirements will have taken place will be influenced by changes in productivity and thrift.

Changes in productivity may arise, as Mr. Clower points out, from inventions or other sources, and thrift also is subject to many influences. Indeed, we may say that these are in a sense only names for certain superficial aspects of the whole complex course of economic history, and Mr. Clower's aim is not, I think, to isolate productivity and thrift because they are more important than other strands in that skein, but because he wishes to get these recurrently self-assertive explanations of interest permanently filed away in the right box.

Despite the solutions to which we may resort for a practical means of handling, in our theoretical discussions, the co-existence of a "stock" mechanism and a "flow" mechanism in the market where money and bonds are exchanged for each other, this co-existence remains the most serious theoretical problem concerning the interest rate. In his article "The Equivalence of the Liquidity Preference and Loanable Funds Theories and the *New* [italics in original] Stock-flow Analysis" [20], Mr. Cliff Lloyd concludes that it is at present unsolved. He presents the matter formally, in the frame of Professor Hicks's demonstration that the liquidity preference and loanable funds theories are equivalent:

> "In a consistent n-good system, two of the goods being bonds and money, if any $n-1$ excess demand equations are satisfied, the nth must also be satisfied, thus the nth may be dropped. . . . The loanable funds theory drops the money equation, the liquidity preference theory drops the bond equation, but the two are equivalent. . . . This is quite a simple and clear-cut proof, provided that each of the goods in the system is represented by only one excess demand equation, but . . . in an explicit stock-flow theory any stock-flow good will be represented by two excess demand equations" [20].

A stock-flow good is one whose quantity, existing as a stock at each instant, can be different at different instants because a flow of the good is produced and another flow consumed, and because these flows, each measured as so-and-so many units per time-unit, can differ from each other. By equilibrium in respect of such a good, Mr. Cliff Lloyd means constancy of the stock. However, a price for the good which makes equal the stock existing and the stock desired to be held is not necessarily the same as the price which makes equal the flow produced and the flow consumed. The difference between the desired and existing stocks, considered as a function of price, gives as an excess stock demand equation, the difference between desired consumption flow and flow of production forthcoming, considered as a function of price, gives us the excess flow demand equation. Unless the difference between production and consumption is zero, the stock will be changing; that is to say, the market for the good will not be in equilibrium. The converse, however, is not true. Equality between the flows of production and consumption does not imply equality between the desired and the existing stocks. "Thus according to the 'new' stock-flow economics a

stock-flow good, that is, one which is produced, consumed and held, must be represented in a general equilibrium system not with one but with two excess demand equations" [20]. Hence Mr. Cliff Lloyd infers that, whether or not in fact the liquidity preference and loanable funds theories are one and the same, Professor Hicks's proof that they are so does not hold in regard to a good which is produced and consumed as well as being held in stock. He is careful *not* to infer that no proof can ever be found.

Mr. Cliff Lloyd's argument calls for one or two comments. He does not appear to be justified in saying that Clower and Bushaw [21] were the first to study the equilibrium of a good which is produced and consumed as well as held in stock. Contrary to his assertion, Karl Brunner's article [14] referred to above deals with this case. Mr. Cliff Lloyd's particular problem is the same as that posed by Mr. Llewellyn Wright [17], but Mr. Cliff Lloyd sees no *general* solution. He shows that special assumptions will give us a model where the two excess demand equations are in effect one and the same, so that Professor Hicks's proof would apply. His way of specifying the two excess demand equations of the general case appears to us to be open to criticism. In our paraphrase of his argument we have been speaking, first, of an excess flow demand equation (as he does), but secondly, of an excess stock demand equation (as he does not). He prefers to add together the stock and flow demands and so define his second equation as " the market excess demand equation which shows the total market demand, both stock and flow, for the good." All the difficulties we have referred to in earlier pages, of justifying any particular choice of the length of the period of measurement of the flow, and, more fundamentally, the doubtful propriety of adding together two quantities of different dimension, a stock with no time-denominator and a flow which is necessarily expressed as so much per unit of time, are involved in Mr. Cliff Lloyd's method, which we have therefore chosen to re-express.

In an article [22] later than his book Professor Patinkin has argued as follows: each individual has some stock of money " now," and desires the prospect of having some particular stock at the " next " date when the matter will arise, which date we may (by a usual convention) take to be the same for everyone. Thus each individual's attitude may be *alternatively* expressed, either as a desire for some future *stock* or as a desire for some particular *change*, between now and then, in his existing stock. Dividing this change by the number of time units in the interval, we have a flow. (Professor Patinkin in this particular article does not make explicit the need for this latter step.) Thus, says Professor Patinkin, stock analysis and flow analysis are alternative ways of looking at the matter, and we have not two equations, but one.

This argument seems to us fallacious. The size which a thing has at some instant and its speed of change at that instant are two distinct things, each separately subject to choice. If Professor Patinkin prefers to regard

the individual as choosing the size that his money stock shall have at the "next" date rather than "now" he must allow him to choose *also* the speed at which that money stock shall be growing, or about to grow (or decline) at that next date. However, he writes:

> "Before concluding this part of the paper, I should like to re-state its general argument in the following way: Stock analysis, as well as flow analysis, pre-supposes a period of time: namely the period between the moment *at* which the individual is making his plans, and the moment *for* which he is making them. Hence if the periods pre-supposed by the analysis are the same, the excess-demand function of stock analysis must be identical with that of flow analysis. This proposition holds also in the limiting case where the period is an instantaneous one."

Why does Professor Patinkin think that the individual, in making his plans *for* a particular moment, must only concern himself with the change which will then *have occurred* and not with the one which will then be about to occur? Why, in other words, should the individual concern himself only with *one* future moment? Is it because Professor Patinkin is in this passage concerned only with "static equilibrium"? But in static equilibrium analysis do we speak of plans and distinguish the moment when they are made from the moment when they apply? The really essential point, however, is that stock equilibrium can be achieved *instantaneously* by *price changes, e.g.*, of bonds, without the price which effects this equality between desired and *existing* stocks necessarily bringing about an equality between the stocks desired for the "next" relevant date and the stocks which, comprising existing stock and impending "production," will exist on that next date.

Patinkin's position of 1958 [22] has been criticised by Mr. Hugh Rose [23], who refers in a short note published in 1959 to a 1957 article [24] of his own. In that earlier article Mr. Rose interprets and contrasts the Keynesian and loanable funds theories of interest. Professor H. G. Johnson [25] had suggested that the Keynesian theory is "static," seeking only to explain the state of affairs in a short-period equilibrium and how changes in circumstances will alter the equilibrium values, while the loanable funds theory is dynamic and seeks to explain precisely how interest and income move from one equilibrium to another when circumstances have changed. In contrast with this position of Professor Johnson's, Mr. Rose sees Keynes's theory also as dynamic.

In Mr. Rose's general dynamic model (providing a formal frame within which both Keynesian and loanable funds theories can be dynamically interpreted) it is assumed that the expenditure plans of both households and business are always realised, any discrepancy between the total of these plans, on one hand, and current production, on the other, falling on the buffer stocks of finished goods held by producers. Such a discrepancy is the excess demand (positive or negative) for goods. The excess demand

for money is the difference between the stock of money which the public desires to hold and the stock which exists. The loanable funds theory says that the interest rate will change if the sum of the two excess demands is other than zero. The Keynesian theory (in Mr. Rose's view) says that the interest rate will change if, and only if, the excess demand for money is other than zero. If, then, we believe that the excess demand for loans is the sum of the excess demands for goods and for money, Keynes appears to be maintaining that the interest rate can change even if the excess demand for loans (the excess supply of securities) is zero, and remain constant even when the excess demand for loans is not zero. Mr. Rose's solution of this dilemma is two-fold. First, he rejects "Walras's Law" that the algebraic sum of the excess demands for goods, money and securities is zero. Secondly, he shows that in Keynes's construction the excess demand for loans is always equal to the excess demand for money.

This latter result arises in the simplest fashion. Producers finance the whole of their production (of consumption goods and investment goods taken together) by sales, made concurrently with the production itself, of consumers' goods and securities. If the total of consumers' goods and securities which income receivers want to buy is smaller than the total that producers want to sell the difference is plainly an excess demand for money, and this excess demand for money is exactly the excess of the securities offered by producers over the securities demanded by income receivers: the excess demand for money and the

$$\begin{pmatrix}\text{excess supply of securities}\\ \text{excess demand for loans}\end{pmatrix}$$

are equal. An even simpler statement of the matter is as follows: In the Keynesian system the excess demand for goods *in any one period* is identically zero; for we are to conceive of decisions how much of this and that good to produce within, say, the coming month being taken at the beginning of that month and always adhered to. When goods have been produced someone has in a sense bought them, whether they wanted to or not; for someone has done the work and has a claim to the result. The lack of sufficient effective demand shows itself, in the minds of enterprisers, *before* they take their decisions as to how much to produce in the coming month; and naturally they are much influenced in their production decisions by reflecting on how much of last month's production has been left, contrary to their plans, on their own hands and been "bought" by themselves.

There is no doubt in the present writer's mind that Keynes thought of the interest rate as adjusting itself to the nut-cracker squeeze of the quantity of money existing and the quantity desired, by changes in the price of fixed-interest securities, as these were offered or demanded by those who wished for extra money or had more money than they wanted. Liquidity preference can, of course, be influenced by very many circumstances and considera-

tions, including the prices and price-changes of consumers' goods or producers' goods: all markets are in some degree inter-dependent. But it is on the securities market that the interest rate actually *emerges* as, *e.g.*, the quotient of Consol coupon rate over Consol market price.

None the less, we must maintain that it is an essential part of Keynes's vision that the interest rate *can* change without any transactions in bonds at all, and without any emergence on the Stock Market of an excess demand or supply of bonds. If it happened that every holder of bonds or money said to himself at some moment: "If the rate of interest were one point higher, my present holding would be just what I should choose to have" and if a testing of the market revealed this consensus of opinion, then the rate might be found to have moved up one point without any transactions. This is made virtually explicit in the *Treatise on Money*.

Professor H. G. Johnson's highly condensed and wide-ranging survey article [25] on "Some Cambridge Controversies in Monetary Theory" is remarkable for the contrast between the ease with which he is able, on Keynesian lines largely made explicit by Mrs. Joan Robinson, to handle every kind of shift in the macro-economic situation and show what sequence of changes will be undergone by the interest rate, the net investment flow, income and the rest, when some autonomous psychological, technical or political transition disturbs an equilibrium, on one hand; and on the other, the awkward and artificial air of his account of them in terms of a Robertsonian dynamics. Professor Johnson says that "The Keynesian theory ... is a static theory; it is not concerned with the succession of changing [partial] equilibrium positions but only with the position which represents an equilibrium of all the forces at work." This may be formally true; I am sure it does not represent the spirit or purpose of Keynes's thought. To be formally correct, Keynes ought, no doubt, to have carefully specified the precise character and mode of operation of the influence exerted by prosperous conditions on the inducement to invest, and to have pointed out in so many words that prosperous conditions arise when, for any reason, employment, output and income are increased; and so on. He did not do so. The accelerator, the "investment coefficient" and all such are markedly absent from the *General Theory* (though not, in substance, from the *Treatise on Money*). In Chapter 22 of the *General Theory*, however, Keynes indicates plainly his conception of the way in which wide shifts of the *schedule* or curve of the marginal efficiency of capital induce abrupt and great changes in investment and hence in all its dependent variables.

Is it then better to have highly special, arbitrary and clanking mechanical systems, in which our assumptions single out one or two variables, make expectations, confidence and the whole gossamer fabric of investment-incentive to depend on these alone, and tell us precisely what effect a change in these variables will have on investment; or is it better to recognise that the inducement to invest is influenced by countless subtle aspects of the

recent past and the "news" (all taking colour and meaning, of course, from the historical background which has conditioned men's minds and bequeathed them their resources) and leave ourselves freedom to analyse these from case to case as best we may by *formally* treating (as Keynes did in effect) the inducement to invest as autonomous or exogenous? Again, when we try to understand the effects of changes in the quantity of money, is it better to chase packets of money in and out of the labyrinth of balances held or spent at different times for different kinds of purpose, at the greatest risk of muddling the identities of the various packets and the dates of the various transactions, or is it better to consider a *stock* of money, existing at a particular moment and matching or failing to match the stock desired at that moment; desired for a list of motives which we can make short or long at convenience: payments reserve, speculative asset, "finance" marshalled for impending investment or what you will; and thus to show what market forces, at that same moment, will bear on the prices of bonds and thus push up or down the rate of interest? Keynes's critics have discussed whether his system is static or dynamic: they have not seen that it is *dramatic*, and that this quality arises from his method of cornering many problems and complications in one concept and dealing with them by a radical simplification. That this is the true Cambridge secret has been well understood by Mr. Lawrence E. Fouraker [26]. Writing of Marshall and Keynes he says:

> "Their intellects were too proud, resourceful and thorough to go on with the thesis without firmly establishing the connections. Having satisfied themselves, however, they employed a curious device when it came to recording the results of their pursuits. Instead of leading the reader through the intricate analytical processes that their own minds had recently traversed, they would provide a short cut, in the form of an assumption whose purpose was to eliminate consideration of the difficult problem they had faced and solved."

If all Keynes's critics had possessed Mr. Fouraker's insight, what seas of ink could have been saved.

IV. The Classical System: Incomplete or Over-determined?

The question "What determines the interest rate?" has been in post-war years one of a group of intimately linked problems which in the course of debate have seemed to swing round each other continually in a sort of whirlpool, now one, now another becoming central as article succeeds article from writers with different viewpoints. Among these problems is the question, discussed with brilliant clarity by Becker and Baumol [27], whether, as Lange [28] and Patinkin [29, 30, 31, 32] have maintained, the Lausanne School and other neo-classicals so defined their systems that *either* these systems were incomplete through asserting the *identical* equality

of total commodity demand and supply (Say's *identity*) and thus being able to show only how inter-commodity exchange rates are determined and unable to show how absolute money prices are determined, or *else* that they were self-contradictory through assuming, in addition to Say's identity, that stocks of money are wanted for their own sake, so that the total stock of money can be other than just what, at given money prices of commodities, is desired, and can thus affect the demand for these commodities and make it other than equal to the supply. In brief, are the commodity market and the money market entirely separate from each other, so that the one determines in a wholly self-contained manner the *relative* prices of commodities and the other determines nothing because there is in it only one good, and this is always available (being not a real money but a mere *numéraire*) in just the quantity required, just as runs in cricket are available to the man in the scorer's box in just the quantity he requires for recording the events in the field of play? Or, on the contrary, are the markets connected so that when there is an excess supply of money there is *ipso facto* an equal excess demand for goods?

Becker and Baumol argue (with the support of much evidence by quotation) that what the classicals had in mind was not Say's identity but Say's *equality*. At first sight we might be inclined to think that Say's equality is a mere definitional truism to the effect that in equilibrium demand and supply are equal. But Becker and Baumol mean by it the assertion that if an equilibrium is disturbed, as by an arbitrary increase or reduction in the existing quantity of money, a new equilibrium will be found through such changes in the price-level as will make the new quantity of money just sufficient. For if the desired and existing money stock are unequal, people will offer a greater, or smaller, total money value of commodities than they demand, in order to acquire, or dispose of, stocks of money. When money prices of commodities have been given time to adjust themselves to this pressure the desired stock of money, which depends on the prices of commodities, will have adjusted itself to the quantity existing.

The question which here interpolates itself is this: if we add to the assumed system a bond market, will a change in the price of bonds, that is, a change of the interest rate, help to adjust the desired to the existing money stock? From Ricardo to Patinkin, some have said that the long-period *equilibrium* interest rate will be unaffected, and will therefore have no effect on the equilibrium of the rest of the system. Keynes, being uninterested in the long period (in which, by definition, all prices including those of productive factors are perfectly flexible), said nothing about long-period equilibrium, but said instead, like Ricardo, that in the short period the interest rate will be different and will affect other things.

Becker and Baumol do not themselves consider any role of an interest rate, but conclude that the neo-classicals did not treat the economic system as divided into two entirely separate enclaves, the non-monetary and the

monetary, but instead believed, as Becker and Baumol express it, that "money derives a 'utility' from the goods it can buy, it is true, but because it can buy them at the moment the buyer considers convenient."

From a conventionally simplified frame for the question whether or not an economic system, given time, will adjust itself to any change in the size of its money stock so as to reach a new equilibrium not differing in essentials from the old, the ripples have spread out towards answers based on more and more subtle and complex assumptions. Mr. E. J. Mishan [33] distinguishes between a "cash balance effect" and an "asset-expenditure effect," and charges Patinkin with having treated them as one, at first under the name "Pigou effect" and later as "real balance effect." When the price level falls, even a person who happens at that moment to have no cash balance may feel a desire or a freedom, because his assets are now worth more in terms of the kinds of goods he desires, to spend more per time-unit on such goods. If, however, his assets consist partly in cash, he will have an additional incentive to increase his expenditure per time-unit. For now he has in hand a larger stock of cash than is needed for convenience in bridging the time gap between receipts and outgoings of cash, and so it will be natural to get rid of some of the surplus cash. Once we introduce bonds and a bond market into our system, it is plain that surplus cash may be spent either on commodities (encouraging their output and raising their prices directly) or on bonds (lowering the interest rate and encouraging investment, and so other output, *indirectly*). Because of such considerations, it is exceedingly difficult to justify any particular line of separation between monetary theory and interest theory.

In the brilliant article of 1956 by S. C. Tsiang [34] we find carried a stage further the policy of generalising the analysis so as to embrace the mutual influence of interest, employment, output, income and velocity of circulation. Mr. Tsiang's first purpose is to show, in a manner quite different from that of Walras's Law, that the liquidity preference and loanable funds theories of the determination of interest are identical "in the sense that the two sets of demand and supply functions, *i.e.*, the demand for and the supply of loanable funds, and the demand for money to hold and the stock of money in existence, would determine the same rate of interest in all circumstances, if both sets of demand and supply functions are formulated correctly in the *ex ante* sense."

Mr. Tsiang rejects the approach via Walras's Law on the ground that it links interest no more intimately with money than with any of the other multifarious goods of the general equilibrium system. Walras's Law, which simply says that the demand for everything, including money, is necessarily identical with the supply of everything, including money, shows that in the general equilibrium system we have one redundant demand and supply equation which follows from all the rest, and that accordingly some one equation, *no matter which*, may be dropped. Such an argument leads

to no more explicit theory of interest than the mere statement that interest is included in the general determinate equilibrium. To invoke the Law is, says Mr. Tsiang, to use an *ex post* definition of the demand and supply of money.

Mr. Tsiang's criticism of Fellner and Somers [16] concerns the very fundamental question of how to combine stock and flow demand in one analysis. Fellner and Somers, he says, define the total supply of money as total money expenditures on goods and services as well as on the purchases of "claims" plus the amount of money held unspent.

> "This total of the so-called 'supply of money,' the main components of which are flows over time, does not necessarily equal the total stock of money in existence (which is the usual meaning of the supply of money in the liquidity preference theory) unless the period of time over which the flows of money expenditures are measured is so defined as to make them equal."

Mr. Tsiang in his positive analysis does in fact define a "period" with this special purpose in view. But his "period" is in effect an instant, his payments are merely the allocation to various uses, by each holder of money, of all the money he possesses at that instant. In fact, Mr. Tsiang is simply adopting that definition [35] of the total quantity of money in existence, which says that it equals the total of all payments that can be made by all money holders *simultaneously*. By compelling all the economic subjects in his system to make payments at such discrete instants, Mr. Tsiang combines the notion of stock of money existing *at* an instant with flow of payments made during some time *interval*, viz., the interval separating two of his discrete instants. Thus he shows that when people want to hold money, *for whatever reason*, and there is in total only just so and so much money for them all to hold, something must adjust their desires to this circumstance. That something is the rate of interest, and it is a matter of indifference whether we call his system a liquidity preference or a loanable funds system.

We said, however, that Mr. Tsiang's construction allows people to desire to hold money "for any reason." This, in his view, is the crux of the matter and the point on which he thinks liquidity preference theorists took a distorted view. Perhaps he is doing them an injustice. His starting-point (where surely everyone can agree) is that demand and supply schedules are *ex ante* concepts. It is indeed obvious that, since they express potential reactions, conditional decisions as to what will be done should this or that circumstance arise, they must refer to intended, future action; they are descriptions of people's forward-looking states of mind, even if we happen to be studying those states of mind from a viewpoint which places them in our past. Now Mr. Tsiang fastens upon Keynes's admission, in his article [36] called "Alternative Theories of the Rate of Interest," that intended acts of large-scale investment may provide a special motive for liquidity

preference, that is, for desiring to accumulate or marshall large money balances ready for the execution of these investment schemes. Such mobilising of money " at the ready " for investment, Keynes called the motive of " finance." It was, in his view, just one more source of a desire to hold money rather than to be the possessor of someone else's I.O.U.s. Now Mr. Tsiang says that this " finance " motive is merely a part of the ordinary " transactions demand " for money. We can wholeheartedly agree with him, and so would Keynes have done, and so does Professor Hicks in his famous " Suggestion for Simplifying the Theory of Money." Professor Hicks says, in effect, that when your desire for money arises from the transactions motive, it is a desire to have money *ready* to make payments, because the time which will elapse between your receipt of the money and the need to pay it out is, or may be, too short to make the lending of a small sum worth while. Of course, the transactions motive is an *ex ante* motive. Whoever said it was not? Only proponents of a mechanical quantity theory of money.

Mr. Tsiang concludes his sections on interest with these words:

> " All the disagreements between the loanable funds and liquidity preference theories on practical issues seem to arise from the failure on the part of liquidity preference theorists themselves to perceive the dependence of the aggregate liquidity preference (or demand for money) function upon the consumption and investment functions."

We feel bound to say that this statement betrays a misunderstanding of the *methodology* of the liquidity preference theory. That theory elects to concentrate on the question: Given the expectations, plans, uncertainties, hopes and fears, as well as the distribution of resources, which exist *at some moment*, where must the price of bonds stand to equilibrate the resulting market impulses? Those expectations and plans have been shaped by past history and by the most recent " news," but they have been so shaped by an inter-play so complex and subtle as to defy explicit analysis. We can, if we wish (and Mr. Tsiang is one among many who have wished), make assumptions which will enable us to trace explicitly the emergence of today's market situation from yesterday's. Such a model will be a mind-clearing stereotype of certain aspects of how things happen in the economic world. But in what sense, or under what conditions, can they serve as predictive models?

Mrs. Joan Robinson introduces her article on " The Rate of Interest " [36] with a definition of " a dynamic analysis " which will surely never be bettered. Its characteristic is, she says, " that it cannot explain how an economy behaves, in given conditions, without reference to past history; while static analysis purports to describe a position of equilibrium which the system will reach no matter where it started from." She further explains the paradox of Keynes's *General Theory*: " Short-period analysis is concerned with the equilibrium of a system with a given stock of capital and

with given expectations about the future. Past history is thus put into the initial conditions, so that the analysis is static in itself, and yet is part of a dynamic theory." Thus we have, from Cambridge itself, a sanction and confirmation of Mr. Fouraker's thesis [26].

Disposing first of the role of productivity and thrift, Mrs. Robinson shows that these govern the answer to the question " What rate of interest will bring about full employment? " For a fall of the interest rate stimulates investment, and the degree to which investment needs stimulation, in order to make employment full, depends on the size of the saving-gap to be filled, and this gap itself is, if anything, made smaller by a fall in the interest rate. If the market rate of interest ever stands below the full-employment rate there will be inflation which will drive the market rate up to equality with the full-employment rate. The latter thus provides a " floor " for the market rate.

Turning to the short period, Mrs. Robinson ascribes the relation between the income expected from each kind of asset, and the price of that kind, to the varying types and degrees of illiquidity which those kinds involve. These types of illiquidity she distinguishes as *inconvenience*, *capital-uncertainty*, *lender's risk* and *income uncertainty*. Inconvenience is the lack of a perfect market, depriving the asset-holder of " the power to realise its value in cash, whatever the value may be at the moment." Here we have perhaps some ambiguity about the meaning of " the " value. This sounds like " market value "; but the market value *at any moment* is what can *immediately* be obtained, and if the market is limited and imperfect this may be nothing. It might be better to define inconvenience as the asset-holder's lack of assurance that whatever (now unknown) value he shall attach to his asset at some future moment he will be able at that moment without delay or cost to sell it for that price. Uncertainty concerning future capital value can be otherwise expressed as uncertainty about what rate of interest will rule at future moments. Keynes, Mrs. Robinson says, " regards the rate of interest primarily as a premium against the possible loss of capital if an asset has to be realised before its redemption date." Lender's risk is the fear of the borrower's default. Income-uncertainty exists for the lender when he lends on short term and will have soon to relend at he knows not what rate of interest.

Different assets, Mrs. Robinson says, are affected in different degrees by each of these qualities. Bills are very little, and bonds very much, subject to capital uncertainty, while the case is reversed for income uncertainty. Thus the relative prices and yields of bills and bonds will depend, given the supply of each, on the relative (weighted) number of " widows and orphans " who desire certainty of *income* and financial institutions who set great store by their balance sheets and desire certainty of capital values. " The general pattern of interest rates depends on the distribution of wealth between owners with different tastes, relatively to the supplies of the various kinds of assets."

On this basis Mrs. Robinson discusses the kinds of ripples or of permanent changes of level which will occur in the interest-rate pond when various disturbing events, such as changes in the quantity of money, in expectations, in thriftiness, in the size of the investment flow, and such as the adoption of a cheap-money policy, are thrown into it. Far the most intractable of these influences is expectations, and these she treats by a masterly and highly realistic *tour de force*, that of assuming that at all times, with greater or less conviction, people assume that interest rates will sooner or later return to some "normal" level which more or less recent experience has established in their minds. This accepted "norm" can itself be changed, and a cheap-money policy ill-timed or too recklessly pursued, which has therefore to be abandoned, may strengthen the general belief in a norm which is higher than the one that might have been established by a more canny approach.

There was, until 1930 or thereabouts, a "Cambridge" approach to monetary theory, in which the names of Marshall, Lavington, Robertson and Keynes suggested distinct but harmonious variants. In 1926, indeed, Sir Dennis Robertson's *Banking Policy and the Price Level* lit up the horizon of professional economics and heralded the great era of monetary theory that lasted until the War. The generous acknowledgment it made of suggestive discussions with Keynes promised a Cambridge school as closely knit as the Vienna or the Stockholm school. Unhappily the cave was not big enough to hold two giants. Sir Dennis's apparatus, with its refreshing terminology of "splashing," "lacking" and so forth, was aimed at a careful unravelling of the monetary skein. It has its lasting place in the history of thought, it typically illustrates its inventor's ingenious power to match the closest analysis with the freest fancy, and it explains the delight which his style has given to thousands of hearers and readers. Keynes's ultimate method, by contrast, was the sword of Alexander. He cut, not unravelled, the monetary tangle of ideas.

The Cambridge concert of ideas was split by the *General Theory*, and even Professor Hicks's powerful synthesising habit of mind has been unable to close the gap. That gap, we are therefore entitled to assume, is unclosable. We cannot here avoid an expression of view. The Keynesian whale under Mrs. Robinson's management can swallow with ease all fish which come to its jaws. To play them with Robertsonian hook and line, with no matter what ingenious shifts and stratagems, is much more laborious.

In his review [37] of Maurice Allais' *Economie et Intérêt*, Professor Kenneth Boulding has shown with what brevity and verve the heart of interest may be penetrated:

> "What is determined in the market [he writes] is not strictly the rate of interest but the price of certain 'property rights' . . . stocks, bonds or items of physical property. Each of these . . . represents to an individual an expected series of future values, which may be both

> positive and negative. If this expected series of values can be given some 'certainty equivalent' . . . then the market price of the property determines a rate of interest on the investment. This rate of interest, however, is essentially subjective and depends on the expectations of the individual; the objective phenomenon is the present market price of the property."

As basic theory this, we think, is irreproachable. It is true too, as Boulding later hints, that nothing in life can in strictness be justifiably taken as certain: for what sort of guarantees does the human situation offer? None the less, we must qualify Boulding's position, for the practical necessities of life drive us to accept some things as unquestionable: sunrise and sunset, eventual personal dissolution and the payment of due interest by the British Government! The series of future payments to which a gilt-edged security gives the right is still, and with entire good sense, *treated in practice* as certain, even though the whole civilised fabric to which such arrangements belong is now destructible. Thus the yields of gilt-edged securities of various terms, short, medium or long, come very near to being "objective" interest rates. Professor Boulding has, strangely, omitted to mention the basic uncertainty which afflicts even the holder of gilt-edged, and which ultimately explains the very need for positive interest, namely, the impossibility of knowing *when and at what price* he will be driven by circumstances to sell his security. His main contention surely is invincible: the search for a "pure" interest rate in abstraction from "risk, liquidity, convenience, etc." is meaningless, "a search [in a dark room] for a black cat that isn't there."

In the foregoing we have tried to illustrate, by a commentary on selections from the post-1945 literature, those of the central problems in the determination of interest which have mainly engrossed attention since wartime preoccupations receded. In addition to this debate on fundamentals, there have been a number of more special contributions. Mr. F. P. R. Brechling [38], Dr. Börje Kragh [39] and Mr. Ralph Turvey [40], to mention them in alphabetical order, have pointed out that "the amount of money which people desire to hold as a store of wealth depends not only on the rate of interest but also on the *total* amount of wealth available." Thus in order to describe the effect of an increase in the existing quantity of money, two kinds of "reaction curves" are needed, one showing the reaction of the rate of interest to increases in the money stock effected by open-market operations which merely *exchange bonds for money* and leave the total stock of wealth unchanged, and the other showing the reaction of the rate of interest to *ceteris paribus* changes in the money stock. "The two curves will co-incide if the marginal propensity to hold money is zero."

Upon the results of his skilful empirical research into the finance of small businesses, Mr. N. J. Cunningham [41] has built a theoretical analysis of great ingenuity. His first basic finding is that the opportunity cost to a firm of investing its own ploughed-back reserves in the purchase of equip-

ment is, for a variety of reasons, less than the cost of borrowing funds for the purpose. The most important of these reasons is that, by borrowing, an entrepreneur endangers his firm in a manner, and to a degree, which does not arise when he lays out his own undistributed profits which have been held in the form of cash or easily marketable securities. It is impossible in a few lines to do justice to Mr. Cunningham's subtle and thoroughgoing discussion, but he points mainly to the fact that, so far from being able to borrow unlimited funds at a constant market interest rate, the entrepreneur is acutely aware that the cost per unit of his borrowings will increase with the size of his total debt and that these borrowings will eventually reach an absolute limit, which will, moreover, become narrower at those very times of difficulty for the firm when borrowing may be most necessary to it. This power to borrow, Mr. Cunningham urges, is looked upon by the business-man, and should be treated by the economist, as a form of liquid reserve, a means of satisfying his precautionary and speculative motives for desiring liquidity. The " subjective " cost to the entrepreneur of using borrowed funds for the purchase of durable equipment must therefore reflect a *double illiquidity*. It requires the lender to substitute an illiquid asset (viz., an I.O.U.) in his portfolio, for a liquid asset, viz., cash; and it deprives the borrower of one possible source of liquid funds which he could otherwise resort to in emergency or in face of an unforeseen profit opportunity. The consequence of this difference of implication between owned and borrowed funds is that the curve of *marginal cost of funds for investment* is likely to have a step or jump-discontinuity at the point where " owned " funds are exhausted and resort must be had to borrowing. This vertical segment of the curve is the most striking of several features of the situation, all of which lead, in one set of circumstances or another, to the conclusion that changes of the market interest rate may quite visibly leave the firm's inducement to invest in equipment unaffected. These considerations are an important theoretical complement to the argument advanced in Section II of this article.

Mr. George Clayton [42] has considered the very interesting problem of the *velocity of circulation of real balances*. When the velocity of circulation of money is slow, as in a business depression, can the banking system of its own power do anything to increase the frequency with which given quantities of *real purchasing power* change hands? His article points out how in some circumstances the public's desire for larger nominal balances regardless of the loss of income involved, with the resulting divorce of the long-term from the short-term interest rate, added to the insensitiveness of investment to any fall of the long-term rate which may be achieved, can frustrate the speeding up of the " real " velocity of circulation even in a depression with heavy unemployment of resources. When there is full employment the banks' attempt to increase their outstanding loans merely results in higher prices. One way of expressing these well-recognised facts is to say that the

banking system's power to increase the nation's nominal stock of money is by no means necessarily a power to increase the nation's money income, still less its real income. In introducing the notion of "real velocity of circulation" Mr. Clayton has, we think, greatly contributed to ease of discourse on these matters.

Mr. J. K. Eastham, in a very valuable article [43], has traced the fluctuating historic distinctions between the interest and the profit components of the earnings of "capital," and has shown the importance, for a theory of accumulation, of keeping interest among the obstacles and profit among the inducements to investment, that is, to the construction of specialised, concrete equipment.

From this survey of recent tendencies in the theory of how interest is determined, we turn now to consider the state of opinion, and to make some suggestions of our own, about the role of interest in the theory of the inducement to invest.

PART II. THE ROLE OF INTEREST

V. The Investment Horizon

A change in an interest rate can, like a change in any other economic variable, transmit with more or less effect, and more or less delay, an impulse from one part of the economic system to another. Theory suggests that its more powerful effects are likely to be upon the demand for durable goods and upon the balance of payments. Demand for durable goods, whether by producers or householders, is investment, and the question whether interest-rate changes do or do not appreciably affect investment has been actively studied by observation, question and analysis from the 1938 attempt by the Oxford Economists' Research Group onwards.

A necessary tool for any such study is a clear conception of the *formal* role of the interest rate in the *formal* structure of a profitability calculation. Since money in hand can be lent at positive interest wherever an organised loan market exists, money in hand is equivalent on to-day's market to a larger sum of deferred money. Expected instalments of profit, or of services (such as enjoyment of a house) having a market value, are deferred money, and in order to find to-day's market worth of a series of such instalments, each must be adjusted for its deferment and, in some cases, also for its uncertainty. Any such instalment which is treated as free from uncertainty must accordingly be divided by: one plus the annual interest rate: and must be thus divided once for each year of deferment.

Since the interest rate thus occurs in the denominator of a fraction, this fraction, which is the "present" or "discounted" value of a deferred, but certain, unit instalment, will be smaller, the larger the interest rate. Thus to-day's demand price for any asset or object which is counted upon with

certainty to yield specified deferred instalments will be lower, the higher the interest rate. If other relevant circumstances are unchanged, and if in particular the cost of production of such an asset is independent of the interest rate, fewer such assets will be demanded in each time-unit after than before a rise of the interest rate.

This scheme of analysis can be refined. We can suppose that the supply price of any type of equipment (any "machines") rises as the number of units ordered per time-unit increases. We can suppose that the series of deferred instalments attributed to the asset is a different one in the minds of different individuals, each relying upon some information, and some interpretive background of experience, private to himself. Each will then have his own demand price and, we may suppose, his own convenient number of machines which he will order per time-unit provided the supply price is less than his demand price. When the number of machines being supplied per time-unit is such that the corresponding supply price is just low enough to evoke that number of orders per time-unit we have an equilibrium.

But suppose that we wish to express such an equilibrium as consisting in the equality of a "rate of return," on one hand, and the loan interest rate, on the other? The appropriate formal algebraic equation looks exactly like the one by which, given the loan interest rate, we calculate the present value of a given series of annual deferred instalments. The meaning of the letters in this equation, however, is different. Instead of a present value or *demand price* we now have on the left-hand side a *supply price*, and instead of the loan interest rate prevailing in the market, we have on the right-hand side an *unknown* whose numerical value is to be determined by solving the equation. This unknown percentage, or, if we prefer, vulgar fraction or decimal fraction, is the marginal efficiency of capital. In equilibrium, the marginal (or "lowest effective") demand price of each sort of machines, and their supply price, will have been driven to equality by the search for profit. In equilibrium, therefore, the marginal efficiency of capital will have been driven, by rising supply price, to equality with the interest rate on loans. This means that, in equilibrium, the personal demand price entertained by the least sanguine of those business-men from whom an order for machines is actually elicited, will be equal to the supply price, and that therefore the percentage per annum at which this marginally sanguine placer of orders must discount his expected profits, to make their present value equal to the supply price of machines, is equal to the loan rate he must pay on money borrowed to buy these machines.

We need not, however, suppose that there are any intra-marginal investors. If we assume that the series of deferred instalments, which a machine is counted on, by the potential investor, to yield to him if he buys it, depends itself upon the number of machines ordered, and that each of these instalments is a decreasing function of that number, we can suppose

each business-man to carry the number of orders he gives per unit of time up to that level where his own ("personal") demand price for machines is no greater than their supply price. Thus a much more interesting sense is given to the word "marginal" when we speak of the marginal efficiency of capital. If, in this case, we cease to assume implicitly that loans of no matter what term carry one and the same rate of interest, and suppose instead that each deferred instalment of profit or service is discounted at the particular rate appropriate to its own deferment, then we can accommodate in our scheme of thought the idea that some business-men will value more highly than others the prospect of recovering relatively early the money they propose to invest in machines. Such men will direct their orders to machines of types which offer an *early* concentration of instalments, each large relatively to the total amount of the whole series of instalments promised by such a machine.

In all this there has been no mention of depreciation or amortisation. Have those notions any relevance for investment decisions? Depreciation is loss of value or prospective earning power by a durable good. When a potential buyer of such a machine looks forward to a date at which some particular set or portion of the deferred instalments which it promises will have been obtained from it he will see it as destined to have, at that future date, a lesser value than it has now, and a value which he can reckon on the basis of the deferred instalments lying *beyond* that date and the interest rates which, by inference from the rates prevailing *now* for loans of various terms, he can reckon to prevail on that future date. This gradual ebb of value, as it occurs, will have to be somehow reflected in the book-keeping of his business and in the published condensations of those accounts, and for this purpose it may suit him to represent this decay by a conventional "depreciation allowance" whose annual amount may be a constant or a term of a geometric series or what not. What has this convention of book-keeping to do with the basic profitability or non-profitability of the investment? Nothing.

It is a pity that a number of writers on the question whether the size of the investment-flow is responsive to changes of interest rates, or not, still feel it necessary to encumber their analyses with irrelevant discussions of amortisation. An interesting debate followed the publication of the evidence obtained on that question by Professors M. D. Brockie and A. L. Grey [44], who had concluded therefrom that the interest-elasticity of firms' demand for equipment was low. Professor W. H. White [45] interpreted their figures differently, but failed to convince them, and the debate must be called inconclusive. It did, however, raise the exceedingly interesting question of the lengthening which Brockie and Grey [46] believe to have occurred in the "pay-off period." If the yearly profit which a proposed investment is counted upon to earn is taken as constant for all years there will be some number of years such that the total profits of those years

equals the first cost (construction cost) of the investment. As a more refined definition, we may take the pay-off period to be that number of years whose total *discounted* profits equal the construction cost of the investment. In the Oxford Economists' 1938 study [47] business-men were often heard to say that they would not order equipment unless it promised to " pay for itself in 3 (sometimes even 2) years." Grey and Brockie [44] found that 85% of their respondents used either the " pay-out period " method or " an alternative formulation amounting to virtually the same thing (the percentage of initial cost of the investment recovered out of earnings each year) . . . for evaluating prospective investments." White [45] comments upon this:

> " Because the pay-out-period method requires that initial cost be recovered during a very small number of years, it connotes very short economic horizons, very high required rates of return and unscientific investment planning; consequently, the investment plans of 85% of large firms may be assumed unaffected by the cost of capital."

Any economic theoretician will readily sympathise with Professor White's attitude. Nevertheless, we must beware here of letting pure theory kick aside too much of practical realism. Can it be truly called scientific to base profitability estimates on years too far ahead for knowledge about the observable *present* to throw any light upon their circumstances? Professor White is correct, as we showed many years ago [48], in saying that interest-rate changes will be almost powerless to change the inducement to invest, when the planning horizon is only two or three years into the future. But this is not a reason for pretending that we can see beyond the horizon.

Why do [48, 49] business-men place their horizon at only two or three years ahead, and *ignore* deliberately the possibility that their proposed equipment may still, in the years beyond that horizon, prove capable of making goods which will sell for more than the running-costs of the machines? It is because they cannot be *sure* that these profits will be earned, they cannot brush aside the threat that newer inventions will enable their rivals to undercut them or to oust their product with a better one. The present throws light on the immediate future, but that light dims rapidly as we peer farther ahead. The business-men are not " unscientific," they are cautious. Now plainly no equipment is worth buying if the money to be spent on it will not be recovered, let alone any return for " enterprise," " decision-making," " risk-taking " or the general services of the enterpriser. If only three years' profit can be counted on, that profit must be at a rate equal to one-third, at the very least, of the first cost of the machine. A minimum requirement of 34% per annum may seem, at first glance, to be a deliberate rejection of countless profit opportunities which might yield, say, 20 or 15%, still much in excess of the *loan interest rate.* In such an argument two wholly different ideas are being utterly confused. To spend £1 million and to get back £150,000 in each of three years, and then nothing, is not to make a profit.

The true relation between the crude annual profit, assumed to be the same from year to year and to be earned for just so-and-so many years and then to relapse to nothing, and treated as a proportion of the first cost of the equipment, on the one hand; and the rate of return which can be legitimately compared with the loan rate of interest, on the other; is simply the following. Each year's assumed profit is to be divided by: one plus an " unknown " fraction: divided once, for each year of deferment; the answers thus obtained are to be summed, and their sum is to be set equal to the machine's first cost. The resulting equation is then to be solved for the " unknown " fraction, and the numerical value obtained is the " marginal efficiency of capital " which can be compared *meaningfully* with the interest rate. There is still no mention of amortisation. An example [48] will illustrate the matter. Let the first cost of a machine be 100, and the assumed earnings (excess of sale proceeds of product over *running* costs, no mention of amortisation) in each of the next three years be 40, with nothing thereafter. Then the marginal efficiency of capital is 10% per annum, and *it will not pay* to buy this machine with loaned money on which a rate of interest of more than 10% per annum has to be paid, notwithstanding the appearance that the machine is going to earn " 40% per annum " of its first cost.

In any such calculation the air of precision and certainty are entirely bogus. We have deliberately spoken of " assumed " profits. What is in question here is the need for some basis of argument, something to be set against the background of fact, news, experience and technical knowledge which the business-man has at command. We have avoided speaking of expected profits, for the reason that " expected " can cover everything from a feeling of conviction to the merest toying with a wild hope. The business-man who resolves to count on nothing beyond three years ahead is well aware of the open door to good fortune which he will thus offer. If all goes well, the machine which has earned 40% of its first cost in each of the first three years of its life may continue to do so, thus realising a large over-all gain.

By contrast with these uncertainties, the powerlessness [48] of interest rates, within the ordinary range of 2–8% per annum, to influence the demand price of *near horizon* equipment by undergoing any change of a size which may be supposed to occur within months, is a matter of plain arithmetic. It is plain for anyone to see what kind of difference is involved when we divide the supposed profit of three years hence by $\left(\frac{104}{100}\right)^3$ instead of by $\left(\frac{105}{100}\right)^3$, that is by $\frac{225}{200}$ instead of by $\frac{232}{200}$. This is the sort of difference made when the interest rate changes by a whole percentage point, from 5 to 4% per annum.

The ineradicable uncertainty of enterprise, the nearness of the horizon thus imposed, the powerlessness of interest rate changes, are all intimately

bound together. Where this uncertainty is less (it is, of course, a subjective thing, a judgment or a state of mind, we are not called upon to justify a feeling that some forms of durable goods are more confidently counted on than others to yield profits in the distant future) the interest rate may have a powerful leverage. A house which is counted on to yield £100 per annum for eighty years has, at an interest rate of 4% per annum, a present value of £2,400; at 2% per annum it has a present value of £4,000. Upon which of the equal annual instalments, counted upon with certainty to be received from some durable good, does a small change of the interest rate used for discounting have the largest *absolute* effect in altering the present value of that instalment? The answer [48] may at first surprise a reader who has not come across it. The greatest absolute change in the present value of any one equal instalment affects that instalment whose deferment, in years, is equal to the reciprocal of the annual interest rate. Thus if that rate is 3% per annum the largest gain in present value, due to a change to 2¾% per annum, will be achieved by the instalment due in thirty-three years' time. It would be for our children or our children's children to say whether or not we should allow a change in the yield of Consols to tempt us to build houses for them, could we but consult their future knowledge now!

VI. Harrodian Dynamics

We turn to a broader canvas. Sir Roy Harrod's *Towards a Dynamic Economics* [50] reverts in its broad style and spirit to the classic models, where the whole darkling plain of human affairs was in view, but its economic features were emphasised by the lamps of settlement. A different metaphor suggests its character in detail.

Rivers, tides and ocean currents irresistibly present themselves as an image and analogy of the economic process. There are the short-period waves and the idiosyncratic storms, there are tides and more constant, one-way currents acting slowly over great stretches of time. This picture is brought to mind by the view of interest which underlies Sir Roy's economics of long-period growth or decline. No one better understands Keynes's short-period pre-occupations or his view of interest as the hourly and momently fluctuating equilibrator of Bull and Bear expectations. Yet in his *Towards a Dynamic Economics* [50], written immediately after the War, Harrod is concerned with the slowest, most deep-seated and steady forces which bear upon, and are transmitted by, the rate of interest. The view that liquidity preference and expectations (the speculative motive), however important and spectacular their effects, are waves on the surface of a deep tide representing the "real" forces of thrift and productivity, is one shared in some degree by writers as widely separated as Sir Dennis Robertson and Mrs. Joan Robinson. Like Mrs. Robinson, Harrod in discussing the long-term forces, reverts in effect to the older usage whereby "interest"

covered any gain due to the possession of a stock of wealth, other than the market appreciation of the assets themselves. Saving is the continual or repetitive act by which wealth is permitted to accumulate. What considerations in the income-receiver's mind must be overcome by a positive interest rate, in this older sense, if he is ever to save?

> "There are two quite distinct reasons for spending now rather than waiting for a larger sum later. One is that the larger sum may veritably have less utility than the smaller sum now, the other the lack of telescopic faculty whereby we fail to estimate justly the utility that the larger sum will have."

In the secure and virtually tax-less Victorian world the well-to-do no doubt looked upon "the family" and its "fortune" as everlasting, only provided each successive generation took seriously its duty of maintenance and improvement. But can we, even so, argue as though life were a space within which there is free movement for the human individual; as though he were provided with some sort of fix-point and a mental theodolite, by which he can survey the country of life and make some objective comparison of the utility a given expenditure would give him at different parts of that life?

> "A man may choose to sacrifice 2 units of utility—of utility not money—in 20 years from now for the sake of 1 unit now; but in 20 years' time he will presumably regret having done so."

At the later date, we might by this reasoning equally well argue, he will regret not having lived for twenty years at subsistence level in order at last to be rich. In so far as *any* current consumption impoverishes my later years, I ought to live in a garret in order to be buried in a Pharaoh's tomb. But in what sense can the actual, experienced and not merely imagined utility of one moment be compared with that of a different moment? What common ground, what fix-point is there, in the time not of the sophisticated outsider but of the living individual in his moment-to-moment experience? Every comparison of *my own* utility (not that of the "economic subject" under my microscope) which I can *in fact* make is inevitably made at some one moment. Who has the right to tell me that this comparison is ill-judged? What sense will it make, in forty years' time, if my then self says, "That young man ought to have saved for my old age instead of spending to enjoy his youth?"

These are intensely difficult matters and we may perhaps be forgiven for taking an unusual view of them. In doubting the meaningfulness of that sort of inter-temporal comparisons which underly Böhm-Bawerk's "first ground" for the existence of interest we are saying only that a man cannot stand outside of time and of his own immediate present, and weigh the relative expediency, by some objective, impersonal, omni-temporal standard, of this act or that. Comparisons of "then" and "now" are made *now*. There is no "third point" in time, no neutral, a-temporal common ground,

from which the comparison can be made so as to leave the individual still free to act "now" in whatever way that comparison suggests.

The central and continuous theme of *Towards a Dynamic Economics* is the search for those various sets of circumstances, any one set among which, once attained, would carry the economy on a path of steady enrichment of each and all of its subjects; and if such circumstances seem too precarious or elusive, then a search for the policy and means by which the economy can be consciously held to such a path. Sir Roy looks upon a steady, slow secular fall of the interest rate as able, to some extent, to take the place of the accelerator in providing an inducement to invest strong enough to keep the economy at full employment along a rising ceiling of output. The accelerator, if relied upon alone to maintain full employment, might require a pace of growth of output *greater* than the upward slope of the ceiling; a pace of growth, that is to say, which it would be impossible to maintain. Therefore the rate of interest must be pushed ever downward in order that a steady *deepening* of the structure of capital equipment may reinforce the *widening* induced by the growth of output. Besides the problem of a chronic tendency to under-employment equilibrium there is, however, a second problem, that of the business cycle, and here Sir Roy regards the interest rate as wholly ineffective. He compares as follows the two problems:

> "While the fall in the long-term rate may not produce any strong immediate effect by making entrepreneurs reconsider their productive methods or by making durable goods more attractive to the consumer, it is not inconsistent with this to hold that in due time, that is after there has been time for the lower rate to sink in and become part of the furniture of the mind of entrepreneurs and others, the various adjustments consequent upon it may add up to a sizeable amount."

But—

> "This does not help us with our trade cycle problem. What we there want is responsiveness preferably within a few months, but, at the very worst, within a year or two. . . . I am inclined to attach great weight to the views of those who urge us not to expect a very great increase of capital outlay in the period immediately following a change in the long-term rate of interest."

* * *

Interest is the most paradoxical of all economic quantities. At first sight it seems to present us with the opportunity of doing calculations, and of obtaining in this way results which are at once quantitatively exact, logically inescapable and theoretically interesting. It is one of the main pillars of the claim of economics to be Queen of the Social Sciences, the only one of those sciences reducible to mathematical statement and analysis. It runs in an unbroken thread through the whole theory of accumulation of wealth, both on the saving and on the investment side, and thus seems to

reign over the theories of employment, of money, of growth, of the general price level and of the balance of payments. It can appear, from this viewpoint of pure theory, as the pivot of the entire system, the sun in the midst of its planets. Yet when examined closely, these claims dissolve. It has been admitted from Marshall's time at least that the influence of the interest rate on saving is doubtful even as to its algebraic sign. More recently its influence on investment has been denied on the basis of business-men's own testimony. Bank rate is still nominally the Bank of England's leading-rein for the commercial banking system, but it has had to be reinforced by "directives," special deposits, hire-purchase regulations and what not. It seems likely that the interest rate, or the system of rates, will continue to receive from theoreticians the homage due to a ceremonial monarch, without in fact counting for more than such a monarch in the real affairs of western nations.

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RISING EXPECTATIONS AND ECONOMIC DEVELOPMENT

I

CONTEMPORARY development planning tends to place main emphasis on the accumulation of capital and the use of advanced modern technology. The purpose of this article is to suggest that more importance should be attached to measures that aim directly at stimulating human beings to the exercise of increased effort and ingenuity.[1] Such measures may even facilitate the accumulation of capital.

Students of development recognise that, in most of the underdeveloped countries, human attitudes towards the expenditure of effort and ingenuity must change radically if development plans are to succeed.[2] But development plans seem to rest largely on the hope that these changes will come about as a result of the availability of improved techniques and additional capital equipment. Until the validity of this position is more clearly demonstrated than it is to-day it would be a mistake to rely on it exclusively.

Since development planning in the free world has reached its most articulate state in India, the issue can best be illustrated by reference to the Indian Five Year Plans. The First Five Year Plan states:

> "The level of production and the material well-being a community can attain depends, in the main, on the stock of capital at its disposal. . . . The larger the stock of capital, the greater tends to be the productivity of labour and therefore the volume of commodities and services that can be turned out with the same effort. *The productivity of the economy depends on other things also, as for instance the technical efficiency and attitude to work of the labour that handles the available capital equipment.* But the stock of capital reflects in a concrete form the technological knowledge that underlies the organised processes of production, and while other factors are important and essential a rapid increase in productivity is conditional upon additions to and improvements in the technological framework implicit in a high rate of capital formation."[3]

The question for consideration is whether the sentence I have italicised should not have a greater weight.

The Second Five Year Plan continues with the same point of view: "It is no exaggeration to say that the most important single factor in promoting economic development is the community's readiness to develop and apply modern technology to processes of production."[4]

[1] In its preparation I am very grateful to Sir John Crawford of the Australian National University for many helpful comments, both critical and constructive.

[2] See especially W. Arthur Lewis, *Theory of Economic Growth* (London, 1955).

[3] *The First Five Year Plan* (Government of India, Planning Commission, 1952), p. 13.

[4] *The Second Five Year Plan* (Government of India, Planning Commission, 1956), p. 12.

This point of view becomes very clear when employment is considered in relation to development. The general position taken in the first two plans seems to be that accumulation is a necessary condition for employment, and consequently, in the early stages at any rate, there may be conflict between the objectives of development and raising the level of employment. On this the First Plan states:

> "In a country with vast reserves of unutilized manpower, the problem . . . is that of increasing the productivity of labour so that larger employment can be provided at rising levels of real income. This is obviously linked to the whole question of capital accumulation and technical efficiency to which we have already referred. There may be, in the initial stages, an apparent conflict between the need for making the maximum use of idle manpower and the need for raising productivity, but it is essential to recognise that, over a period, progress in one is apt to be checked by insufficient progress in regard to the other."[1]

The alleged conflict between employment and development arises because, in the opinion of the authors, the allocation of available capital to the labour-intensive techniques that will maximise employment is unlikely to maximise output. Such a conflict may well exist, but it will be lessened to the extent that there are possibilities of increasing employment and output with little or no initial investment.

The emphasis seems to shift somewhat in the Third Plan. With its growing awareness of the need to increase agricultural production, there is increased recognition of the possibility of making rapid and efficient use of idle human resources—with nominal capital expenditures as a prerequisite. Nevertheless, the plan stresses improvement of productive techniques and says little or nothing of motivations.

In academic discussion one of the best-known exponents of a capital-accumulation approach is the late Ragnar Nurkse. His prescription, presumably for a free economy, is that one of the main problems of under-developed countries is to resist the international demonstration effect; that government policies of taxation should be designed as far as possible to keep *per capita* consumption constant as the unemployed are absorbed into investment projects. Nurkse holds, furthermore, that government action to maximise the incremental saving ratio is not inconsistent with leaving the investment function in private hands. (There are other reasons, such as the need to construct social capital, which requires heavy investment.[2])

The possibility I want to suggest is that changes in attitudes towards work, resulting in the expenditure of greater effort or the exercise of greater ingenuity, may bring about increases in output of both consumption and capital goods, with little or no previous accumulation. In that event, the

[1] *The First Five Year Plan* (Government of India, Planning Commission, 1952), p. 23.
[2] Ragnar Nurkse, *Problems of Capital Formation* (Oxford, 1953).

task of accelerating development, especially in its early stages, can be greatly facilitated. Instead of a reduction in consumption being required to make way for an initial act of capital accumulation, accumulation and consumption can both increase together. Or at any rate the capital requirements for getting things under way can be held to manageable proportions.[1]

The issue is not a new one; it harks back to the ancient controversy between Ricardo and Malthus. Ricardo's view—which the Indian planners have inherited—is that accumulation is a necessary and sufficient condition for increasing production and employment. This leads to John Stuart Mill's dictum that "The demand for commodities is not the demand for labour." The issue is well illustrated by the following dialogue.

Malthus stated:

> "Yet it will be most readily allowed that the saving from revenue to add to capital is an absolutely necessary step in the progress of wealth. How then is this saving to take place without producing the diminution of value apprehended?
>
> "It may take place, and practically almost always does take place, in consequence of a previous increase of value, or of revenue, in which case a saving may be effected, not only without any diminution of demand and consumption, but under an actual increase of demand, consumption and value during every part of the process. And it is in fact this previous increase of value and revenue which both gives the great stimulus to accumulation, and makes that accumulation effective in the continued production of wealth."

Ricardo commented, "This is one way undoubtedly."

Malthus added, "The fortune of a country, though necessarily made more slowly, is made in the same way as the fortunes of individuals in trade are generally made—by *savings*, certainly; but by savings which are furnished from increased gains, and by no means involve a diminished expenditure on objects of luxury and enjoyment."

Ricardo commented, "It will however be allowed that an individual may improve his fortune by a diminished expenditure on objects of luxury and enjoyment. Why may not a country do the same?"[2]

According to Say's Law, supply creates its own demand. What I am suggesting is that there is something to be said for the opposite point of view: that demand creates its own supply. The truth is more likely to be between these extremes: demand and supply or wants and activities interact on each other in the course of development; with new wants giving rise to new activities and new activities to new wants.

[1] After development gets under way the rate of accumulation may be greater under such a policy than it would be under one that aims directly at a maximum savings ratio.

[2] See Sraffa (ed.), *Works of David Ricardo*, Vol. 2, *Notes on Malthus's Principles of Political Economy*, p. 376.

II

The emphasis to be placed on saving and investment will depend on conditions in particular countries; and no general prescription can be given. There are, however, reasons both contemporary and historical that may bias development programs unduly in the direction of investment. They therefore deserve critical examination.

(1) In the first place, many of the underdeveloped countries are affected with extensive unemployment or underemployment. Moreover, this unemployment is demonstrably not of the type that can be cured by Keynesian methods of monetary expansion. Consequently, it is concluded that the marginal product of labour is close to zero. Therefore, employment can be increased only through the accumulation of capital or improved technology which will raise the marginal product of labour and will permit an increase of employment at the prevailing (subsistence) level of wages. In other words, the situation is a pure Ricardian one.

There is, however, another possibility. The marginal product of an additional man may well be zero in the sense that more men on existing farms would add nothing to the product. But it does not follow that if those already employed exerted greater effort, their product would be zero. There may simply not be room for an additional man, but there may be plenty of room for extra individual effort. In general, twice the effort per head expended by a given number of men is likely to be more productive than the same effort expended by twice that number—provided the need for specialisation is satisfied. Moreover, if extra effort can be attained at the prevailing real wage per man, the price of a unit of work would be reduced; and higher wages per man can be consistent with a lower cost of labour per unit of effort.

Labour may expend more effort or exercise more ingenuity simply from a spontaneous desire to be economically effective. A more likely possibility is that a man will do more work, depending on the additional goods he can get in return for his increased effort. The returns to his exertions will depend on the productive equipment at his disposal. A man may feel it futile to increase the effort he expends on driving a team of bullocks. But if he is already motivated to increase his effort, his motivation may well be stronger if at the same time he can obtain more efficient tools and techniques. On the other hand, without that motivation, improved tools may mean less work and no increase in the product. Provision of capital and techniques may be necessary, but may not be sufficient conditions for increased output.

(2) A second possible reason for the emphasis on saving and capital formation is the alleged effect of the "revolution of rising expectations." Because of contact with the West, it is held, there can be no question of lack of demand. In fact, one of the major problems of the underdeveloped

countries is to curtail demand so as to make room for capital formation. The argument requires further refinement. The " international demonstration effect " can manifest itself in a variety of ways. One possibility is that the wants to which it gives rise may have very little economic effect. African tribesmen may want radios in the way a child wants presents. If by good luck he gets a radio it will be his prized possession, but he will not bestir himself to get it. A second possibility is that the effect of new wants is to produce excess demand which can result in inflation. Or it can result in capital consumption; which would happen if a farmer were to sell his plough in order to buy a radio.

The third, and the constructive possibility, is that the demonstration effect may work on both demand and supply. People not only acquire the taste for the goods of the West but they also acquire the habit of expending the effort needed to acquire them, and of allocating that effort between immediate consumption and acquiring the equipment for increasing consumption in the future. In that event, the demonstration effect is complete and constructive and can act as a powerful stimulus to development.

The problem therefore is not to suppress the revolution of rising expectations, but to make it complete—to provide the essential link between the emergence of new wants and the expenditure of additional effort. A programme that delays unduly the realisation of those expectations may not be the most efficient in achieving the desired increases in output.

(3) A third possible reason for the emphasis given to investment is the impressive economic performance of Russia, and more recently that of Communist China, which may turn out to be even more impressive. These countries have followed the Ricardian prescription by holding consumption as low as possible, maximising surplus value and devoting an ever-increasing surplus to capital formation and to increasing military strength. Granting that the model has worked well in authoritarian economies, does that imply that it will apply equally well in a free economy?

From the point of view of making the model work, the Communist state has some important advantages. In the first place, it can coerce and cajole labour and need not rely mainly on the motivations and incentives that are necessary in a free economy. But even the Communist state cannot entirely dispense with the need for material incentives. Secondly, the State, as the sole accumulator, need not be concerned with the problem of investment incentives. It faces no danger that savings will go uninvested because of low rates of return or high rates of discount. It can use the products of steel mills to build further steel mills indefinitely. In short, the classical system is made to work not on the basis of the choices of individuals but by making the demands of the State, with an insatiable appetite, the mainspring of economic activity.

Neither coercion nor cajolery is consistent with the principles of a free economy. Freedom implies that the individual can choose his occupation

or choose between working and not working; and the amount of work he does is related to his material rewards and expectations. If the most effective use is to be made of human resources the question of economic incentives to the individual therefore cannot be brushed aside.

Whether a free economy can establish the same rate of saving and investment that is possible in an authoritarian one is a more difficult question. Is it possible for private investment incentives to be such that *per capita* consumption can be held constant, and the national surplus continually invested? Can private investment go on for a generation without being validated to some required extent, by increasing consumer demand? This is conceivable but not likely.

(4) Finally, the classical theory depicted the conditions that prevailed during the first half of the nineteenth century in England. Wages did not rise appreciably, hours were long, and there seems to have been no question but that labour expended all the effort of which it was capable. Accumulation went on at a rapid rate. Malthus' objection to Ricardo may then have been more relevant to the underdeveloped countries than to England.

To assume that the argument can be transferred to the underdeveloped countries of to-day overlooks two important facts.

In the first place, the Industrial Revolution was supported by a population that believed that hard work and accumulation were moral and social obligations. Referring to the Weber–Tawney thesis, a recent report on African states:

> "The complaints made to-day about the African worker underline the fact that there are nowadays cultural expectations in Western societies—'You must work hard'—'You must learn to accept responsibility'—which are ingrained and indoctrinated. They form part of the climate of life, and *in the African tribal economy they are totally unknown.*"[1]

Secondly, investment opportunities were provided in England by a continually expanding export industry.

If these conditions were met in a contemporary underdeveloped country its problems would be simple. If Ghana, for instance, had a British labour force in addition to the present market for its cocoa, its development problems would be solved.

III

Let us now consider a practical possibility of expansion stimulated by rising expectations. Suppose the Indian farmer becomes impressed with the need to own a bicycle. He thereupon attempts to increase his purchasing power. He can do this by putting his family to work or increasing food production or by spinning and weaving their own cloth, and thereby saving food for the purchase of bicycles. Spinning wheels and looms can be made

[1] *The Human Factors of Productivity in Africa: A Preliminary Survey*, Report by the Inter-African Labour Institute, June 1956, p. 35.

by village craftsmen. The work is not arduous, so that increased clothing production on the farms need not require increased food consumption. Food production itself can be increased by using underemployed labour to dig irrigation ditches and so forth. After some increase in production is achieved, part of the increase can be used to buy fertilisers in order to increase production further.

With his increased purchasing power, the farmer increases his demand for bicycles. This is satisfied by labour moving off the farm, and thereby releasing more food for exchange purposes. The bicycle factories increase output with their existing equipment by increasing the number of shifts worked. Part of the food they receive is consumed by the bicycle workers, part is used to buy clothing, previously bought by the farmers; and part is invested in expanding bicycle-making capacity. Another possibility is that the demand for bicycles may be so strong that the Government can levy a tax on bicycles, and thus obtain food for its own social-capital projects.

The point of the example is that both consumption and capital formation have been stimulated by the increased demand for bicycles. Some initial capital may be needed for fertilisers or imported steel; but the bulk of the increase has resulted from increased human effort. Desire for bicycles has served the purpose of evoking that effort, which may otherwise not be forthcoming.

The increased demand for bicycles can thus initiate a cumulative process of expansion. The initial increase in demand results in an increase in productive capacity. That increase in capacity itself widens the horizons of the economy and provides a broader base for the exercise of human ingenuity and effort; and as development proceeds, ingenuity will steadily replace effort.

The process envisaged here is one where, alternately, demand stimulates supply and supply sets the stage for further increases in demand. The main difficulties arise at the outset. Initial investment is undoubtedly necessary: to discover natural resources, provide basic transportation and communication and so forth. But individuals should also receive direct encouragement to improve their economic condition and to entertain rising expectations for the future.

Against this position it may be argued that the farmer has all the motivation that he needs, and that the problem is simply one of improved techniques. This position does not seem to me to be tenable. The techniques and implements of cottage industry are well known and available, but are not fully used. In contrast, the Japanese farm family, which is differently motivated, uses all its spare time in such pursuits and, as a consequence, is able to buy refrigerators. Gandhi, himself, encouraged cottage industry in order to revive the spirit of work.

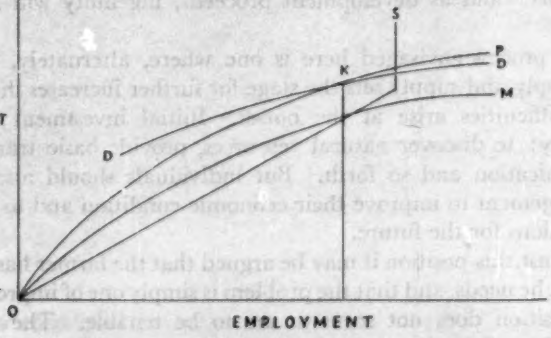
A further example that illustrates the thesis of this paper is afforded by the rapidity with which developed economies have recovered from war-time

destruction. Although German recovery after the Second World War was aided by resources from abroad, it was mainly due to the application of a highly motivated labour force to the production of both capital and consumer goods with the productive equipment that survived the War. Once expansion got under way capital accumulated rapidly, but the process was initiated by the vigour, skill and capacities for organisation and improvisation displayed by labour and management.

The story of the Indian farmer might have had a less happy ending. The farmer might have refrained from buying fertiliser in order to buy the bicycle, so that his future income would be reduced. Or he may have borrowed from a moneylender, incurred a debt that he had no prospect of repaying, but might nevertheless have given a temporary stimulus to bicycle production. Finally, the bicycle producers might not have responded or the Government might not have allocated the materials, so that the increased demand would have been inflationary and unconstructive. In these cases the essential link between increased desires and increased effort is lacking.

IV

I shall now attempt to state the argument more precisely with the aid of a diagram that will draw attention to the general relations between demand, supply and development. The diagram merely involves well-known concepts of classical, neo-classical and Keynesian theory. The crux of the matter, however, is how these curves shift over time in the process of development.



The curves in the figure relate to a short period of time during which the stock of capital, productive techniques and demand and other supply conditions remain constant. Development is depicted as shifts in the curves at discrete time intervals towards higher levels of output and usually employment. The short-run analysis is suggested by, and largely follows, that of Chapter 3 in Keynes' *General Theory*.

The factors of production consist of labour, capital and a fixed supply of "land," including known natural resources. Labour is measured along the horizontal axis in terms of number of persons engaged. The essential fact that the quality of labour does not remain constant over time, but is affected by hours worked, effort expended per hour and skill and ingenuity is taken into account under the heading of productivity changes.[1]

The ordinate of the chart indicates units of product measured in some suitable and consistent way. I shall not go into the question of measurement of the quantity of capital, which lurks in the background.

Turning now to the curves, *OP* is the "product curve." It is derived from the production function and indicates the product that can be obtained from varying quantities of labour, and fixed capital and land. In these conditions, diminishing returns are naturally assumed. This curve corresponds to Keynes' aggregate supply curve. When the ordinate of the curve is "product" the "proceeds" expected from a given level of employment is obviously the product itself.

From the product curve can be derived the curve *OM*, the aggregate demand curve for labour. At any given level of employment the ordinate of the curve will be that quantity of labour multiplied by its marginal product. Assuming employers or the self-employed behave rationally and competitively, the curve will denote the maximum real wage they are prepared to pay either to others or to themselves.[2]

The curve *OS* is the supply curve of labour; it shows the aggregate real wage at which varying numbers of people will work under prevailing work conditions. In a classical situation it represents total subsistence wages paid at given levels of employment. If, as is frequently assumed,[3] labour at any time is available in indefinite quantities at the prevailing real wage *OS* will be a straight line.[4] However, full employment must occur at some point; and at that point the curve *OS* will become vertical.

The *DD* curve is the Keynesian aggregate demand curve. It represents

[1] An alternative approach would be to attempt to measure labour not in terms of man or hours, but of "efficiency units." This concept in fact was tentatively used by Marshall (see *Principles*, 8th edition, p. 630). The difficulty with this notion, however, is that changes in the effectiveness of labour alone are very difficult to observe and measure. Such changes are usually accompanied by the accumulation of capital and changes in technology; and frequently those changes are necessary for changes in labour effectiveness. Consequently, it seems preferable to continue to consider productivity changes as a whole, but to recognise that such changes result from a variety of different influences and may have a variety of different effects on the relative marginal productivities of the factors.

[2] The demand curve for labour *OM* could be held to be derived from the *DD* curve rather than from the product curve. But since we are here concerned with a succession of equilibrium positions, it is not necessary to go into this question—provided that, in equilibrium, we can assume that the real wage is equaled with the marginal product of labour.

[3] *E.g.*, W. Arthur Lewis, *op. cit.*

[4] If the model were constructed with a developed economy primarily in mind, labour should be measured in hours and *OS* should have an increasing slope. For an underdeveloped country, where habits of work are less flexible in the short-run, measurement in terms of men seems preferable.

the aggregate demand for consumption and investment at varying levels of employment.

The intersections of these curves indicate the various kinds of short-run equilibrium that can occur with a given stock of capital. The process of shifting over time from one equilibrium position to succeeding ones can provide a useful basis for tracing and charting the course of development.

The intersection of *DD* and *OP* indicates the level of output determined by effective demand. If demand in terms of product exceeds the product output will expand; and if it falls below, production will contract in the Keynesian manner.

If Keynesian equilibrium occurs at the point *K*, as it does in the figure, the marginal product of labour will be equal to the real wage; and the system may be said to be in "short-run neo-classical equilibrium."

The great debate between Keynes and his adversaries has been concerned with the question whether conditions of price flexibility, real balance effects and so forth produce full-employment equilibrium automatically. Whether or not such adjustments are possible from a theoretical standpoint, it can be taken for granted that, in conditions of price and wage rigidity, discrepancies between Keynesian and neo-classical equilibrium can exist for appreciable periods, and before any automatic forces have time to work themselves out the economy has moved on to a new position.

Another possibility of neo-classical equilibrium is that the *DD* curve and the product curve *OP* may be identical. This may be termed a Say's Law situation. It implies that at any level of output and employment the propensities to save and invest are identical. Multiplier adjustments of income that bring about equality of saving and investment are ruled out. While saving and investment decisions may be more closely related than Keynes himself contemplated, the assumption of identity is extreme. The lag between many investment decisions and their execution is itself sufficient to render an identity between current saving and investment decisions highly improbable. Consequently, we must in general work with the three curves.

I have passed over these matters quickly, since everything I have said is reasonably familiar and, I think, uncontroversial. We now turn to the use of the diagram for classification of the possibilities of economic growth.

Economic growth involves successive upward and interrelated shifts, over time, of all the curves on the diagram. I shall first indicate the factors that may bring about the shifts in each of the curves and then attempt to describe various processes of development.

The product curve can shift upwards because of the accumulation of capital or because of increases in the productivity of labour or capital or both. The upward shift resulting from accumulation in any year will thus depend on the saving and investment, previously made, that results in increasing capacity in that year. For convenience I shall assume that all investment has a one-year gestation period. If there are no productivity increases

occurring at the same time, diminishing returns to "land" will mean that given amounts of investment will accomplish progressively smaller upward shifts in the curve as time goes on. Or a given proportion of national income saved and invested will shift the curve upwards by decreasing proportionate amounts.

For the purpose of the present argument, productivity increases that produce upwards shifts in the curve can usefully be divided into two categories:

Category A which includes most of what is usually termed modern technology, requires gross or net investment as a catalyst. Gross investment is required because the existing capital stock needs elaborate transformation before modern techniques can be put into effect. Net investment may also be necessary because an industry or firm may have to operate on a certain minimum scale for modern technology to be applicable. Moreover, infrastructure investment in power, transportation and in training specialised personnel may be required. In short, an elaborate stage setting is needed for extensive use of modern technology. Productivity increases in Category A can be taken into account through their effects on the capital–output ratio. They may actually require increases in the ratio during an initial period of capital build-up. But thereafter they will tend to reduce the ratio and thus provide an offset to diminishing returns.

Category B includes the types of productivity increase that do not require appreciable new investment to give them effect. Within this category, this paper is mainly concerned with those that result from changes in the motivations and attitudes of individuals toward work and acquisitiveness, that induce farmers, managers and labourers to expand output with existing equipment. Their essential feature is that they permit expansion of output without the aid of an initial act of accumulation. There are, however, definite limits to this type of productivity increase. Within a given context of land, capital and technology, increases in human effort can be expected to yield diminishing returns. Increases in accumulation and Category A productivity increases open up new opportunities under Category B. On the other hand, the process of development may eventually evoke decreasing human effort and greater reliance on Category A. Thus, while the two categories should be distinguished from each other, their interrelationships should be borne in mind. In practice, the two categories will take place together rather than alternately.

Upward shifts in the product curve are also likely to produce upward shifts in the marginal-product curve. This will definitely be the case where Category B productivity increases are involved or where accumulation occurs with no productivity increase. Conceivably labour-saving technology could associate an upward shift in product with a downward shift in marginal product. This could well occur in particular sectors, but, as an empirical matter, seems very unlikely for the economy as a whole. Nevertheless, the marginal-product curve may rise over time more or less rapidly than the

total product curve; with possible consequences for the saving ratio and the rate of accumulation.

To promote and to validate increases in productive potential, the demand curve must also shift upwards over time. Demand includes both private and public demand; and within each category investment and consumption demand. Private demand can increase as a result of rising expectations; international demonstration effects and so forth. But such increases are not to be dissociated from what may be called Say's Law effects. Say's Law does not have to be literally true for an increase in productive potential to be associated with increases in demand—especially since it is one of the functions of entrepreneurship to insure, as far as possible, that increases in supply are matched with increases in demand.

Furthermore, Category B productivity increases themselves imply increases in demand. At least one reason why people work harder is to get more goods; and the amount of goods they get will have a bearing on their willingness to exert themselves. If increased effort does not result directly from increased demand for goods, both are likely to be the consequence of the same change in human attitudes.

I suggest that increases in private demand, uninfluenced by government policies, generally involve increases in both consumption and investment demands. It is possible to think of a spendthrift economy which consumes its capital with no heed for the future. One that practises parsimony in the present for the sake of affluence in the future is also conceivable. But experience seems to suggest that present and future wants rise together, with the possibility that, as present needs become less urgent, more thought should be given to the future.

Public demand includes the Government's demand for consumption and investment goods. The behaviour of government investment demand will depend on the role the Government assigns to itself in the development process. The Government's demand for consumption, including military, can be expected to increase steadily. The governments of new countries desire military establishments for prestige as well as national security reasons. As a result of rising expectations, government social expenditures are likely to increase steadily, whether or not they are directly related to development objectives.

Whether or not the Government's activities constitute a net addition to private demand will depend on the tax and monetary methods by which it finances its expenditures.

V

With this background of possibilities, we can now examine alternative patterns of development. The patterns adopted by a particular country may be dictated by the nature of its material and human resources, or the Government may be able to exercise some choice in the matter.

I shall assume that the choices are among processes of equilibrium growth, where the Government adjusts demand so as to preserve a moving neo-classical equilibrium (hereafter referred to simply as equilibrium). From the point of view of development, there is no argument for holding output and employment below their equilibrium levels. There may, however, be grounds for keeping output and employment somewhat above these levels, and thus exposing the economy to some mild inflation. But this is a large subject, and is not germane to the present discussion. I shall therefore assume that equilibrium is maintained.

The alternatives I want to discuss are first of Ricardian growth, which identifies development with accumulation and the Category A productivity increase that goes with it; and secondly, a policy that gives weight to Category B and may therefore have to make compromises with respect to accumulation, or there may be no conflict and no compromise needed. Since I believe that it is this latter possibility that Malthus had in mind, I shall term it Malthusian growth.

Ricardian Growth

Assume, to begin with, that labour is available in unlimited quantities at a given real wage and that the economy aims at accelerating the rate of growth. To start the process off an initial increase in capital is required, since no increase in equilibrium output is possible without additional capital. This may be obtained from abroad if the country is fortunate enough to have a rising world demand for its exports. In that event part of the rising export income can be applied, through export taxation or through marketing boards, to the capital needs for development. Or the country may receive foreign aid, or be able to undertake foreign borrowing. Failing those external sources of capital, the initial accumulation must be obtained through curtailment of domestic consumption. This is unlikely to occur on a voluntary basis and will have to be accomplished by taxation. However the initial problem is solved, the country must eventually increase the proportion of income saved internally. If it is to develop on the basis of its own resources its saving ratio must increase from the traditional 5% to 12 or 15%. Again if there are no changes in attitude towards saving, successive increments of national income will have to be subjected to increasingly severe taxation.

If accumulation at the prescribed rates occurs, the product curve *OP* will shift upward from period to period. The important question, however, is on the demand side. If the desired saving ratios are established (with the aid of taxation), in what circumstances will investment demand increase sufficiently to keep the economy on its upward equilibrium path?

There seems a strong likelihood that, in the circumstances described, a large part of the investment undertaken must be undertaken by the Government, or by subsidised private investment. If the process has to

begin with a contraction of private consumption this in itself would be likely to create adverse expectations that would be hard to counteract. The situation would be much more favourable if both consumption and saving could be stimulated by increasing export income. Beyond the initial period, there is likely to be a substantial period of capital build-up before productivity can be expected to increase appreciably. During this period the increasing saving ratio implies that the capital–output ratio will also increase and the general rate of profits will fall. Either the Government must perform the investment itself or it will have to be willing to provide funds to private investors at rates that will make their investment profitable after taking risk into account.

If the economy reaches a state of full employment of labour or if real wages rise as growth proceeds, the tendency of profits to fall will become more acute and the need for government intervention on the investment side is increased.

Once the stage is set for technological change or the market has broadened sufficiently for increasing returns to prevail, difficulties are reduced. Continued growth of *per capita* incomes is possible without continual increases in the savings ratio, and the rate of profits may rise instead of fall, so that inducements to invest are adequate. If it has a mind to, the Government can permit the economy to operate on an increasingly free basis. However, after initial problems of internal capital formation and technology are solved, intractable balance-of-payments problems may remain, calling for continuing government control. Or the need for foreign capital may persist on balance-of-payments grounds after it can be dispensed with from the point of view of capital requirements.

This brief account of the Ricardian approach is by no means novel, and seems in line with the expectations of planning authorities themselves.[1] Rather than go further in the way of detailed analysis, a number of comments on the need for and the limitations of this approach are in order.

(*a*) In some underdeveloped areas the crux of the matter may be shortage of capital, and emphasis on maximum accumulation may be the only prescription that is worth trying. Land may be used to its utmost capacity; and labour may be working as hard as possible. This may well be the situation in Southern Italy, an area whose population has Western attitudes towards work and a Western culture, but where diminishing returns have produced a state of desperate poverty.

(*b*) If the national objective is the establishment of a free economy, the notion that the Government will eventually reduce its control may be

[1] For precise statements of the growth process described above, I refer to Robert Solow's "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics*, February 1956; and to my own article, "Productivity, Real Wages and Economic Growth," *Quarterly Journal of Economics*, May 1960. Both of these articles, however, assume that productivity increases are independent of the growth of capital and consumption. In this article I am trying to move away from that unsatisfactory assumption.

optimistic. The historical record does not indicate that governments are eager to relinquish economic power. The prospects for a free economy may well be brighter if encouragement to individual initiative is emphasised from the outset.

(*c*) The Ricardian approach may lead to the prolongation or even to an increase in tendencies towards economic dualism. Since modern technology in industry requires a large capital base, a country may face difficult choices in the allocation of its limited capital resources. If it pins its hopes in the earliest possible use of modern technology it may be forced to build up modern economic enclaves and to leave the rest of the economy in its traditional state—with the hope that modernism will eventually spread. In particular, such a policy may lead to the neglect of agricultural production for the sake of industry. There is insufficient evidence for confidence in the hope that modern enclaves do spread their influence. Moreover, few countries can afford to neglect agriculture. They may have little prospect of earning enough foreign exchange to permit them to be food importers; and even if they did, the political uncertainties of the world may not commend this course. On the other hand, to spread the available capital evenly over the whole population may delay indefinitely the use of modern methods. To provide every worker with a shovel does not necessarily promote the eventual use of bulldozers.

(*d*) Finally, a policy that aims to maximise accumulation by maximising the proportion of income saved may not be the most effective way to invigorate the population and to obtain from it the effort that is needed for development and may not even maximise the rate of accumulation. In fact, a policy of enforced saving through taxation may well diminish the amount of effort labour is prepared to expend for a given real wage (before taxes). This would be reflected in upward shifts in the labour supply curve, which, from the point of view of development, would tend to offset the effects of upward shifts in the product curve.

Malthusian Growth

The difficulties with the Ricardian approach suggest that it should not be relied on exclusively without considering the possibilities of direct attempts to increase the skill and effort with which human beings use their existing equipment, thus achieving productivity increases in Category B. Whereas the Ricardian point of view is essentially that if labour is given the tools it will do the job. At the other extreme is the view that if labour wants to do the job it will make better use of the tools it already has and will get new ones in addition.

If, with a given capital stock and a given real wage per man, the labour force can be persuaded to work harder and more effectively in order to satisfy both increased demands for present consumption *and* to provide equipment for further increases in consumption in the future, the process of

getting development under way can be greatly facilitated, and the problems of an initial contraction of consumption may be largely avoided. For instance, the amount of capital available from foreign sources may be sufficient, without any initial domestic accumulation. In terms of our analysis the production curve will shift upward without previous accumulation. Output will expand to a new equilibrium position. The additional capital goods will permit a further upward shift in the production curve. This will provide an increased capital base, which will make possible further upward shifts resulting from increased skill and effort. Production becomes increasingly capitalistic, the setting will become increasingly favourable to the use of modern technology and the attainment of the first category of productivity increases.

To round out the picture, the behaviour of the labour supply curve should be considered. Rising living standards are a natural product of development. These, as we have seen, can be a handicap to development if the economy is imprisoned by constant techniques. But when the possibilities of increased productivity are taken into account the effect may be different. It is quite possible that up to a point improved nutrition and living conditions can yield increasing returns in terms of the efforts and effectiveness of the labour force. Consequently, the retarding effects of an upward-shifting supply curve may be more than offset by upward shifts in the product curve resulting from increased labour effectiveness.

With respect to the demand side, demand will rise over time as a result of rising expectations and rising possibilities. As the productive power of the economy increases, wants that were previously mere hopes become translated into active demand. The economic man does not waste his time on dreams, but is concerned with the realm of the feasible. Economic growth makes possible what was previously unattainable; and also generates new and unsuspected desires. Consequently, once the process of growth has started, there is reason to expect continually rising demand.

There is no reason, however, to suppose that our curves will shift upwards in precisely the way that is required to maintain equilibrium from period to period. The Government, through its fiscal and monetary controls, must maintain the balance between supply and demand. It should recognise, however, that if it attempts, by its policies, to frustrate the normal preference of the private economy with respect to consumption, capital formation and so forth the economy as a whole may be deprived of important economic incentives. A policy, for instance, that attempts to maximise the rate of saving may have this effect. Furthermore, the pressure for " unproductive " government consumption expenditures may result in chronic inflation, or, if they are financed in a non-inflationary way, may cut into " productive consumption," in the sense that they reduce incentives for Category B productivity increases.

The foregoing possibilities apply in varying degrees from time to time

and from country to country. As we have already noted, there does not appear to have been any problem of willingness to work in early nineteenth-century England, where the classical theory evolved. Whether or not output could have been increased at that time by more attention to nutritional standards and less to capital formation is a subject worthy of investigation. Significantly, Malthus had to turn to the underdeveloped countries of Latin America or to Ireland for his main examples of economies where an invigorated population may increase output with its existing equipment. But it is with countries that have not acquired Western attitudes towards work that we are at present concerned. The possibilities of increased effort may be important with respect to Asia or Africa, but unimportant with respect to Italy, where accumulation may be of the essence of the problem.

Futhermore, increasing human effort is likely to be important in the early stages of development, and tendencies in that direction are likely to reverse themselves later on. In fact, increasing preference for leisure over work is a leading characteristic of the advanced economies of the West. And it is open to question whether a given man-hour worked is becoming increasingly effective. In the later stages of growth the emphasis tends to shift to technological change which achieves economic growth despite diminishing human effort. The question of effort, however, may become relevant if the advanced economies are impelled to accelerate their growth rates significantly. In that event measures to increase the size and effectiveness of the labour force may be of great importance.

VI

If it is decided that a Ricardian approach to development is fraught with difficulty and that there are possibilities of increasing productivity through the stimulation of human effort, what aspects of development policy should receive increased emphasis? The following suggestions illustrate both the possibilities and the difficulties.

In the first place, policies of extreme austerity should be relaxed in order to permit people to entertain rising expectations. There can be no question of maintaining *per capita* consumption constant, as Nurkse suggests. Living standards must be allowed to rise. This means some compromise with direct attempts to increase savings, but it may require no compromise with the desire to maximise the rate of accumulation. It also means that in allocating steel, the new steel mill should not always have priority over the bicycle factory.

Secondly, individuals should be encouraged to acquire rising expectations, not as a wistful hope, but as a practical possibility. The farm family should raise its sights and broaden its horizons. This means improved communications, improved distribution and also advertising. The fact that some of these items may be carried to excess in developed economies should not obscure the fact that they have an economic function. Consumers should

not only be encouraged to want new things; they should want them enough to pay excise taxes on them, and thus add to saving in excess of what they are prepared to perform on a purely voluntary basis.

Thirdly, available capital should be allocated with due regard for the need to provide the economy at large with a base from which it can expand its efforts. This means a satisfactory compromise should be found between tools for the masses and the enclaves of modern technology.

Fourth, individuals must become aware of the essential link between the expenditure of effort and the acquisition of goods, both in the present and the future: for this the spread of literacy is highly important, but that may not be enough, and it can have perverse effects. I have been told that in Ghana general education has created labour shortages because of the tradition that people who can read and write are entitled to supervisory positions, while manual occupations are still tainted with the memory of slavery. Education should be directed explicitly to teaching farmers to be better farmers, and thereby to improve their living standards. This calls for some of the educational philosophy of the U.S. Agricultural Extension Services.

Fifth, public health measures must increase the life expectations of individuals. The individual must learn to live not only for to-day but for to-morrow and the day after that. He is unlikely to do so if he expects to live only till to-morrow. This need, however, creates the dilemma of the population explosion, and raises emphatically the need for birth control.

Sixth, social and traditional barriers to the efforts of individuals to improve their economic conditions should be progressively removed. It may not be sufficient simply to rely on the process of development, achieved by other means, to modify institutions such as the caste system and the extended family system. Their modification may be a necessary pre-requisite for development.

Many of these elements are to be found in the Indian Five Year Plans; but they seem to be included because the Plans have broader objectives than mere economic development, or because there are political limits to the extent to which austerity can be carried. The question I am raising is whether they should not be accorded greater importance—from the point of view of development itself.

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AFRICAN LABOUR PRODUCTIVITY RECONSIDERED[1]

I. Introduction

An examination of African labour productivity is of interest for two distinct reasons. First, for the very practical reason that for most of Africa success or failure in the effort to achieve economic development will be determined by how effectively man-power resources are utilised. With the exception of a few mineral-laden regions, labour and its efficiency in combination with the other factors of production constitute the continent's primary economic resource.

Secondly, as a problem in the economics of development, low labour productivity can be considered a primary characteristic of most backward economies. Unfortunately the non-capital aspects of output per worker have received little attention. Yet the quality of labour, methods of work and organisational factors may be of overriding importance in countries where, in addition to an underdeveloped economy, the ways of doing things are largely influenced by traditional orientations as opposed to Western economic rationality. This study attempts to clarify these non-capital determinants of productivity in such a society and to suggest their relative significance.

The field work for this study was undertaken in Nigeria, a country of 35 million people, representing one-fifth of Africa south of the Sahara. Information was collected from sixty-three establishments which accounted for a number in excess of 50,000 workers or 10% of the enumerated wage-earners.[2] Private firms, Government Departments and Public Corporations were canvassed. The size of establishments ranged from seven employees to eight thousand, while the managements exhibited wide diversity in nationality, managerial training and complexity of organisation. The types of industry covered included materials processing, food products, consumer-goods fabrication, mineral extraction, construction, industrial services and plantation cultivation.

Ethnically the sample included tribes of Negro, Nilo-hamitic and semi-Bantu origins from all parts of Nigeria. Religious conditioning encompassed Christian, Muslim and animist. The technological background ranged from the very primitive to the comparatively advanced. The country's level of economic development is more or less typical of black Africa; *per capita* income in Nigeria is estimated at £30.

[1] The author is indebted to the Fulbright Commission for financing the research embodied in this paper. He also wishes to thank the Federal Ministry of Labour and the University College, Ibadan, for their cooperation and support.

[2] Federal Government Printers, *Digest of Statistics*, Vol. 10, 1960. This figure does not include firms employing less than ten.

Because of the extent of the sample, the diversity of ethnic and religious factors and the level of Nigeria's development, it is believed that there will be a strong tendency for similar patterns of behaviour, attitudes and capabilities to reappear in the majority of sub-Saharan countries. Thus, the term " African " will be used except when referring to situations unique to Nigeria.

II. The Traditional Image

One does not exaggerate by stating that there already exists a clearly definable, unique and fully elaborated construct of the African worker. The universality of the image is so great, both in and out of economic literature, as to rank it as a major tenet in the folklore of modern Africa.

The source material for this picture of the African worker is a number of Government reports and individual studies.[1] These studies have depicted a situation of excessively high rates of absenteeism and turnover, lack of punctuality and inefficiency and inaptitude in the work place. The following conditioning factors present in the tribal context are cited:

1. In the traditional subsistence milieu, work for individual gain is unknown.
2. Work is an aspect of communal activity intermittently performed for immediate and limited ends.
3. Division of labour does not go beyond sex and age.
4. There is no other discipline or organisation than that imposed by the rhythm of the seasons.

Any incentives to work, including the wage itself, are of limited effectiveness because, as the Inter-African Labour report states, " an absence of conscious need, contentment with little, and consequent improvidence typify tribal life everywhere in Africa south of the Sahara " (p. 35). A quotation from the *African Labour Survey* completes the elaboration of the African worker as he is presently conceived.

> " What has emerged is that, while it is accepted that there is no scientific basis for the proposition that any initial incapacity in the African rests on any difference in hereditary biological constitution between him and members of any other racial group, it is a fact that

[1] J. Orde Browne, *The African Labourer* (London, 1933), and *Labour Conditions in East Africa* (London, 1946); J. Heigham, *Productivity of Labour in the Gold Coast* (Accra, 1953); C. H. Northcott, *African Labour Efficiency Survey* (London, 1947); B. Gussman, *Industrial Efficiency and the Urban African (Africa*, 1953); G. Wintringer, " Considerations sur l'Intelligence du Noir," *Revue de Psychologie de Peuples*, No. 1, 1955; W. Hudson, " Observations on African Labour," *Journal of the National Institute of Personnel Research*, March 1955; Inter-African Labour Institute, *The Human Factor of Productivity in Africa* (Bamako, 1956); International Labour Organisation, *African Labour Survey* (Geneva, 1958).

by tradition and background the African is singularly ill-adapted for assimilation as an effective element in a wage economy on the modern pattern, that the reason that leads him to seek wage-paid labour heavily influences his attitude to work and his response to incentives and that his reactions differ widely from those of the European worker, whose background and aims are so different. It also has emerged that the African's work performance is at present unsatisfactory in many respects by European standards; that in quantity and quality it is often inferior; that the African sometimes lacks pride in his work; that he is often unstable and restless and prone to absent himself apparently without valid reasons" (p. 169).

Before proceeding, several weaknesses in this portrayal of the African worker will be indicated. Three potential sources of error can be distinguished.

(1) *Field Work*

In comparison with the amount of literature on the subject, the field work which has been done is slight. In addition, most of the systematic work which has been carried out dates back to the 1940s. (There was one study in 1954, of two cigarette factories in Uganda.) Given the pace of change in Africa, the findings of ten or fifteen years past will have only limited validity for the contemporary scene.

Furthermore, two territories account for almost all the raw material that goes into the making of "the African worker": the Union of South Africa and the Central African Federation. These are multi-racial communities. For the African worker this implies social treatment as a second-class human being, residential segregation some miles from the place of work, often under abject conditions, and a colour bar to promotion beyond the semi-skilled level. Performance is bound to be affected by these conditions.

Finally, a substantial number of the studies undertaken have concerned themselves with mine and plantation labour. In the first, the nature of the work and its accompanying milieu are extremely unfavourable; in the second, wage-rates are extremely low. Thus neither is representative.

(2) *Method*

The prime fault in the method of almost every study so far undertaken is the inordinate reliance on management and management opinion. In an economic sense management, because its interests often conflict with those of labour, is biased in its presentation of facts and their evaluation. For expatriate managements, who dominate medium- and large-scale enterprise, the situation is further complicated by racial prejudice. The very cheapness of labour tends to make management defensive, insisting

that low African productivity makes labour cost per unit "one of the highest in the world." As will soon become evident, the reverse of this statement is closer to the truth. Finally, the expatriate manager tends to idealise the ability, ingenuity and industry of the workers in the metropole when discussing the relative merits of African labour.

A second methodological fault is the failure to provide the surrounding circumstances when presenting the figures on punctuality, absenteeism, turnover and output per man. The number of hours in the work-week, the distance from the worker's dwellings to the factory, the smallness of the wage foregone for leisure, the paucity of training and the quality of machines and material used in production—few or none of these vital factors are supplied.[1]

(3) *Racial Insulation*

This last factor is a very general one, yet nonetheless very important. Almost universally in Africa the Europeans live in separate communities. They do not speak the African's language. They have only the slightest knowledge of his pastimes, his problems and his goals. This racial insulation results in ignorance and, often, in prejudice. It is likely that this factor is one of the major determinants of the traditional image of the African worker.

III. Indirect Measurements

Indirect measurements of labour productivity, namely absenteeism and turnover, will be examined first. It is usually claimed that absenteeism represents an impairment of plant efficiency, and hence lower levels of output. Substantial turnover means that the workers may be only partially trained, and thus will produce less and at a greater cost in damage to equipment and spoilage of materials. In addition, it is contended that absenteeism and turnover are indices to the industrial commitment of the labour force.[2]

In actual practice absence and turnover are more often a function of the conditions of work and the wage level; in addition they are usually confined to non-essential and unskilled workers.[3] Nevertheless, when viewed in their full context these indirect measures can be helpful guides to an evaluation

[1] Another questionable feature, apparent in all the literature, is the use of the "illustrating incident" (the African who head-loads the wheelbarrow) to support a proposition which could not be supported by any other method.

[2] C. A. Myers, *Labor Problems in the Industrialisation of India* (Cambridge, 1958). By this criterion, Africans show greater industrial commitment than do Indians, absenteeism averaging more than 10% in many Indian industrial establishments.

[3] See H. Behrend, "Voluntary Absence from Work," *International Labour Review*, February 1959, and Sheila Van der Horst, "A Note on Native Labour in the Cape Peninsula," *South Africa Journal of Economics*, December 1957.

of labour's performance. The following table sets forth the data for Nigeria:

TABLE I

Absence and Turnover

Type of firm.	Number employed.	Hourly wage index, 5*d.* = 100.	Hours per week.	Distance to work, miles.	Gross absence, %.	Gross turnover, %.
Bakery	38	120	63	1	3	10
Brewery	80	110	47	5	2	4
Cannery	100	110	45	2	2	†
Perfumery	140	100	42	2	2	4
Cigarettes	180	140	45	2	2	4
Rubber shoes	270	120	60	2	6	4
Brewery	396	120	47	1	2	4
Soap	636	200	45	5	2	7
Textiles	1,100	140	45	5	7	33
Building materials	100	90	45	3	3	3
Construction	135	100	45	6	2	§
Joinery	400	160	45	5	3	5
Rubber processing	90	155	55	‡	3	7
" "	100	100	70	3	7	15
" "	150	90	65	3	9	94
" "	140	110	45	3	3	†
" "	220	100	70	3	4	23
" "	330	120	70	2	4	†
Four peanut oil mills *	1,000	100	45	3	3	†
Cement	380	140	56	‡	2	4
Timber and plywood *	3,200	200	45	3	3	12
Tin-mining	3,500	100	45	4	6	8
Coal-mining	8,000	180	48	2	12	4
Harbour management	8,900	140	45	5	2	6
Palm plantation	600	100	45	‡	2	22
" "	750	100	45	1	7	§
29 establishments	30,935 workers					

* Taken from a C.C.T.A. study for the ILO by F. A. Wells.
† Not available. ‡ Transport provided. § Characterised by seasonal redundancy.

Gross absence includes voluntary absence, sickness and excused absence. Genuine sickness appeared to be about 1%. Gross turnover includes terminations, death and voluntary leaving. The base of 5*d.* per hour wage-rate represents the minimum plant rate for December 1959; the median rate is about 20% higher. Hours per week shows the normal work-week plus the normal overtime; 45 hours is the typical week. Distance to work is the average distance from home to plant; bicycles are limited to a minority of workers.

Two facts stand out. First, voluntary absence and voluntary turnover are low; they are very low when the conditions of work are taken into account. Second, there is a positive correlation between wage, hours and distance-from-work, on the one hand, and absence and turnover, on the other. This important fact, that performance is dependent on working

conditions and not on inherent attitudes of the African, is more clearly seen by a brief examination of three firms.

Analysis of Monthly Absence and Turnover (1959)

Percentages

Firm I.			Firm II.			Firm III.	
Sick.	Absent.	Left.	Sick.	Absent.	Left.	Absent.	Left.
3·1	0·08	0·4	0·3	0·7	1·0	7·4	4·6
3·8	0·10	0·5	0·5	1·3	0·1	12·1	9·7
2·7	0·08	0·4	0·4	1·8	0·6	16·1	17·0
2·7	0·07	0·6	0·4	2·5	0·2	12·7	5·9
3·1	0·06	0·5	0·6	2·0	0·8	7·8	11·1
3·8	0·07	0·3	0·3	1·5	0·6	9·7	11·3
1·9	0·04	0·5	0·5	1·7	0·8	7·5	6·7
2·4	0·04	0·3	0·9	1·6	1·2	5·3	10·4
2·6	0·06	0·5	0·7	1·9	0·8	5·7	6·8
2·3	0·02	0·8	0·7	1·3	0·2	5·5	2·1
2·3	0·03	0·4	0·3	1·6	—	4·8	3·0
2·8	0·04	0·3	0·4	1·2	0·9	16·4	5·0
Annual turnover		5·5			7·2		93·6

Firm I represents the " permanently established " staff of the Nigerian Ports Authority, averaging about 4,100 persons. Wages are high and conditions of work are favourable. The extremely low absence rate is explained by lenient sick-leave requirements and liberal vacation and holiday provisions. Turnover is also low.

Firm II is a privately owned soap factory, averaging 625 workers, again characterised by high wages and favourable conditions of service. Enforcement of rigorous standards results in what appears to be the minimum level in absence, turnover and sickness for a large urban employer.

Turning from the firm with the best conditions, we now look at that establishment which offers the lowest wage and the least favourable conditions of service. Firm III processes rubber. Low wages, long hours, a seven-day week, no vacations, no holidays other than Christmas, no sick leave and difficult working conditions prevail. The result, high absenteeism and excessive turnover, is not unexpected.

In summary, the indirect measures clearly indicate that the African's performance as a wage-earner is satisfactory and can by no means be construed to suggest he is " unstable and restless and prone to absent himself apparently without valid reasons." It is also evident that the degree of absenteeism and turnover is a fairly accurate measure, not of the acculturation of the African worker, but of the wage paid, conditions of service and the physical surroundings.

IV. Work Performance

During the course of this study managers, supervisors, headmen, Labour Officers, training specialists and anthropologists were questioned at some length in order to form a general picture of the African's actual proficiency in the

work place. Although space does not allow a full analysis of the qualitative aspect of work performance, the principal findings can be summarised.

In the unskilled and semi-skilled range three types of work are distinguished. The first is strenuous physical labour. In an underdeveloped country where clearing operations and basic construction account for a large part of development and where machinery to assist labour is scarce, the ability to sustain great effort for protracted periods is of considerable consequence. The lazy savage image to the contrary, it was found that the African surpasses his European counterpart in sheer physical exertion by as much as 50% when the proper financial reward is held out. Similarly, it was found that the African is willing to put in a longer work day, working overtime in larger firms or simply the normal 12-hour day in the smaller ones. This finding is in sympathy with the ethnological evidence relative to traditional labour:[1] subsistence cultivation of unyielding soil generation after generation has bred a high tolerance level for continuous and demanding labour.

A second category of African excellence relative to European is that involving simple repetitive operations, usually coupled with a high degree of manual dexterity. Found in all parts of the continent, the cultural antecedent is thought to be in the African's disposition towards rhythm, which transforms repetitious work into a mildly satisfying experience.[2]

In a third category of work requiring various operations to be co-ordinated the African compares unfavourably with the European: worker efficiency reaches one-half or even a third of the normal standard attained in England. Poor performance in complex situations appears to be a result of the physical environment of the tribal African, lack of a mechanical tradition of the simplest type (the wheel, wedge and lever) and, in general, an unfamiliarity with the machines and processes of the modern world.

As an artisan, the African's performance appears to be directly related to the quality and duration of training. In black Africa as a whole, less than one in ten thousand receives even the simplest technical training.[3] Local traditions help the West African to excel as metal-worker, welder, fitter, railroader, automotive mechanic and marine engineer.[4] On the

[1] R. G. Armstrong, *Peoples of the Niger–Benue Confluence* (London, 1955), pp. 77–155; P. Bohannan, *Tiv Farm and Settlement* (London, 1954), pp. 51–2; M. J. Herskovits, *Dahomey* (New York, 1938), Vol. I, p. 30. See in particular his discussion of the dokpwe. S. F. Nadel, *Op. cit.*; Gunter Wagner, *The Bantu of North Kavirondo* (London, 1956), Vol. II; Max Gluckman, *The Economy of the Central Barotse Plain*, Rhodes–Livingstone Papers, 1941; and I. Schapera and A. J. H. Goodman, "Work and Wealth" in *Bantu-speaking Tribes of South Africa* (London, 1937).

[2] Reported by E. Berg in French West Africa, *Labor and Economic Development*, W. Galenson, Ed. (New York, 1959); A. W. Lewis in Ghana, *Industrialisation and the Gold Coast* (Accra, 1953); and S. Biesheuvel in South Africa, "The Occupational Abilities of Africans," *Optima*, 1952. The explanation is Biesheuvel's.

[3] See United Africa Company, *Statistical and Economic Review*, January 1959, p. 12.

[4] For a discussion of the indigenous metal-working traditions, implements and processes, see M. D. W. Jefferies, "Stone-Age Smiths," *Archiv für Völkerkunde*, Vol. 3, pp. 1–8, for the Cameroons; and S. F. Nadel, *A Black Byzantium* (London, 1942), for the Nupe.

other hand crude native construction materials, lack of fine gradation and the absence of a straight line in the tribal environment render the West African a relatively poor carpenter or mason. In East Africa the pattern is reversed.

The African is a poor supervisor. This is explained by past patterns of forced dependence on the European and by poor training. The cultural endowment, however, is also negative. A simple technology meant that organisation of work was usually unnecessary. The importance of status as opposed to effective performance and diffuse and general obligations as opposed to specific and contractual obligations are further impediments. Nevertheless, with intelligent selection and the use of incentives, supervisory difficulties can be reduced to a minimum.

V. The Supply Curve

Having discussed in general terms the parameters of the African's working capabilities, one further ingredient remains to be added: his willingness to offer his services for wage-earning employment. The shape of this offer curve will largely be determined by his response to monetary incentives.

The prevailing opinion on this pivotal point, as indicated earlier, offers little encouragement. It is argued that the African is both partially dependent on the subsistence economy for his livelihood and enmeshed in traditional obligations. He is accustomed to a low level of material living. Given his environmental background the disutility of continuous labour exceeds the satisfaction from acquired income at a low level. His purpose for entering wage employment is often of the "target" nature, to obtain enough money to pay his taxes, to purchase a bride, to buy a bicycle or shirt. If we couple these factors with his known high valuation on leisure it is clear that the elasticity of his response to monetary incentive may not only be very low, it also may be of a negative character. Thus for the individual worker, the employer may find himself faced with a backward-sloping supply curve.

The evidence cited earlier renders these contentions invalid. The African is, *ceteris paribus*, punctual, stable in his job, diligent in his attendance, with adequate supervision an efficient producer, but above all, he is responsive to monetary incentive. Not only is the point at which additional labour becomes "discommodious" at a constant wage-rate much farther along the supply schedule, but the length and slope of the schedule is respectively greater and less than in the case of the European or American worker. The schematic representation is seen below.

The conditioning factors relative to the dissatisfaction involved with work have already been suggested. We now turn to the factors which affect the Nigerian's desire for money. These factors can be grouped under four motivational headings: traditional inducements, consumption, status and convenience.

It is often contended that commitment in whole or in part to traditional culture necessarily impedes the development of the economic mentality, "the lore of the finely calculated less and more." The rigours of transition from traditional to modern modes of living are usually exaggerated. In the case of West Africa "detribalisation" is not, in fact, a problem.

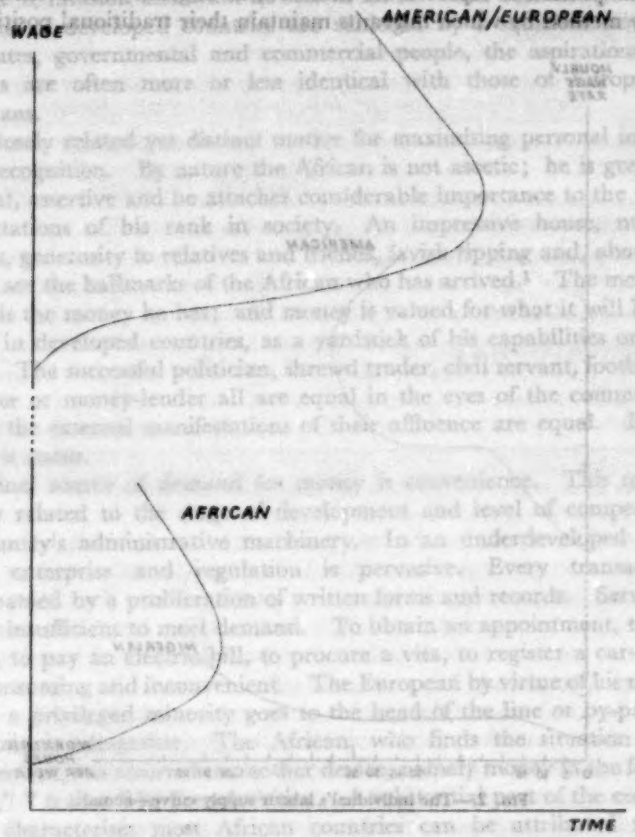

FIG. 1.—The individual's labour supply curve—traditional.

Traditional practices come into contact with the new life, go through a process of monetisation and are integrated into the new pattern. The bride-price, once a certain number of goods and services, is now a sum of money which continues to serve its stabilising function as of old, as well as offsetting the father's expense in educating his daughter and equipping her for married life (sewing-machine, household implements, bicycle). The situation is similar regarding initiation rites, honorary orders and funeral

ceremonies. The more elaborate the trappings and the more opulent the celebrations, the larger is the reward in the traditional system. Even the intricate and far-reaching code of hospitality has to a considerable extent become monetised. Not only is the food and beveridge proffered bought by money, but when the latter is not at hand money may be given in its stead. A similar pattern is reported for multi-racial migrant labour areas. The primary method by which migrants maintain their traditional position is to

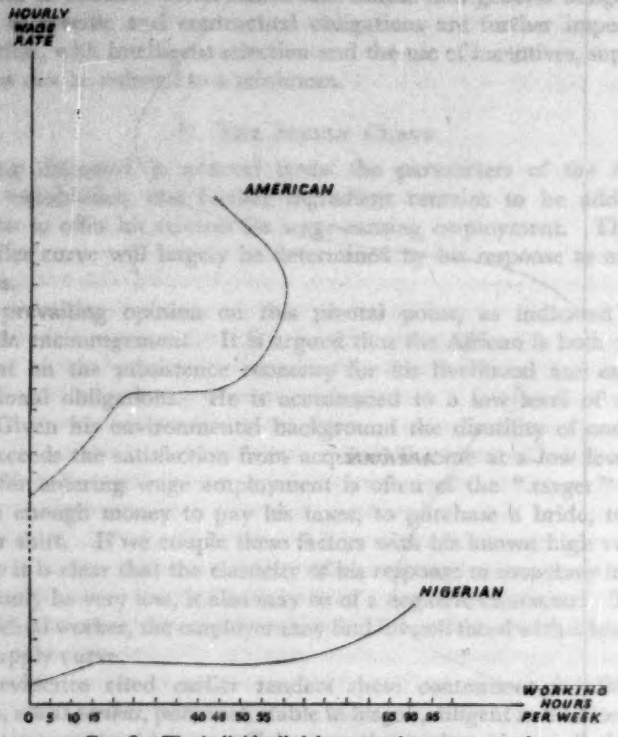

FIG. 2.—The individual's labour supply curve—actual.

send money and presents home and provide housing and education for relatives who come to the city.[1]

Of much more quantitative importance is the desire to obtain goods for personal consumption or use. This general notion was embodied in the rather awkward " revolution of rising expectations " and " demonstration effect." Stated most simply, the African lives in poverty or extreme poverty;

[1] J. Van Velson, " Labor Migration as a Positive Factor in the Continuity of Tonga Tribal Society," *Economic Development and Cultural Change*, April 1960. Also see A. I. Richards, *Bemba Marriage and Present Economic Conditions*, Rhodes-Livingstone Papers, 1940; and Godfrey Wilson, *The Economics of Detribalization in Northern Rhodesia*, *ibid.*, 1942.

he now knows he lives in poverty. Thus he seeks wage-earning employment not just to obtain a shirt, a bicycle or watch but to buy more and better food, decent clothing, electricity for his dwelling, a radio, schooling for his children and members of his extended family, medical attention and so on. His horizons are defined by what he personally observes, what he hears from the rediffusion and what he sees in films. And because the material standards of developed countries are achieved by a sufficient number of expatriates, governmental and commercial people, the aspirations of the Africans are often more or less identical with those of Europeans or Americans.

A closely related yet distinct motive for maximising personal income is status-recognition. By nature the African is not ascetic; he is gregarious, ebullient, assertive and he attaches considerable importance to the external manifestations of his rank in society. An impressive house, numerous servants, generosity to relatives and friends, lavish tipping and, above all, a big car are the hallmarks of the African who has arrived.[1] The measure of a man is the money he has; and money is valued for what it will buy and not, as in developed countries, as a yardstick of his capabilities or attainments. The successful politician, shrewd trader, civil servant, football-pool organiser or money-lender all are equal in the eyes of the community as long as the external manifestations of their affluence are equal. In short, money is status.

A final source of demand for money is convenience. This motive is directly related to the stage of development and level of competence of the country's administrative machinery. In an underdeveloped country public enterprise and regulation is pervasive. Every transaction is accompanied by a proliferation of written forms and records. Services are usually insufficient to meet demand. To obtain an appointment, to see an official, to pay an electric bill, to procure a visa, to register a car—are all time-consuming and inconvenient. The European by virtue of his membership in a privileged minority goes to the head of the line or by-passes the requirements altogether. The African, who finds the situation equally inconvenient, has resorted to another device, namely money in the form of a "dash," "*le dime*" in French Africa. A substantial part of the corruption which characterises most African countries can be attributed to these "convenience payments."

Consumer surveys undertaken in five major urban centres in Nigeria provide empirical evidence relating to the shape and level of the African's demand curve for money.

[1] The author himself lived for five months in an undergraduate hall of the country's only university. Here, above all, one would expect to find goal orientations in a less materialistic bent. Yet without exception all those students queried replied that their goals after graduation were senior service status, a car and other material amenities. There was an awareness of other values, and it was often stated that perhaps their children, reared in a more secure environment, would not be driven by the psychological need to insure themselves against all forms of material want.

African Income–Expenditure Patterns

Comparisons between Artisans and Labourers (Monthly)

	Artisans.	Labourers.
Gross household income	396*s*	205*s*
Household wage earnings	244*s*	117*s*
Wages as per cent. of gross income	69	60
Individuals per household	4·1	3·1
Expenditure per person on goods and services	74*s*	58*s*

Effects of Changes in Income for Clerks, Artisans and Labourers (Monthly)

	Income group.		
	Under 150*s*.	150–250*s*.	Over 250*s*.
Individuals per household	2·8	3·9	5·0
Consumption pattern (selected items), %:			
Food and drink	62	58	52
Clothing	10	13	12
Semi-luxury goods and services	8	13	14
Food consumption (selected items), %:			
Bulk foods	45	41	40
Meat and fish	23	25	29
Drink	3	5	6
Imported foods	5	10	11

Derived from Federal Department of Statistics, *Urban Consumer Surveys in Nigeria* (Lagos). Kaduna and Zaria, 1955–56; Lagos, 1953–54; Enugu, 1954–55; Ibadan, 1955.

It should be noted that the results in the traditional Muslim North were the same as in the more westernised South. The most striking fact is the relation between wage-earning and total income. The wage appears insufficient to meet minimum family needs. The lower the wage, the greater the portion of total income that must be secured in other ways: trading, part-time work, borrowing and gifts. There is also a direct relation between income level and the number of dependents: the higher the income, the more family members the household is required to support.

The level of expenditure per individual for food, clothing and shelter is low: 1*s*. 11*d*. per day for the labouring family and 2*s*. 5*d*. for the artisan family. In almost all cases the household was confined to a single room. The changing pattern of consumption at successively higher incomes is the same as prevails in developed countries.

Although not shown in the table above, approximately 20% of household income goes to monetary transactions (slightly less than 20% for the lower-income groups and slightly more for the higher-income groups). Of this 30% is repayment of loans and about 60% consists of "cash gifts" and "remittances." Our earlier interpretation suggests "cash gifts" comprise assorted convenience payments and hospitality gestures; "remittances" appear to be financial support for unemployed relatives.

From all this, it is manifestly clear that the African's demand for money is not terminal at an early stage. His demand for goods and services is only limited by his purchasing power, in turn limited by his income possibilities. Having a greater desire for money and a lesser means for earning it, it is not surprising that his willingness to work exceeds that of his European and American counterparts.

VI. Direct Measurements

We now turn to the direct measurements of productivity. We will first discuss labour performance on a large plantation, noting significant changes over time. We then turn to inter-firm comparisons of output/man-hour in the rubber-processing industry.

The West African Institute for Oil-Palm Research was established in 1948 as a semi-autonomous corporation. It is supported by fixed annual contributions from the four former British West African territories. The plantation employs approximately 750 labourers. The wage scale and conditions of service are those of the Federal Government of Nigeria. In addition, the workers are provided with bungalows, electricity and water at a nominal fee; free education for children, medicine and recreational facilities are supplied. This wage package compares very favourably with alternative opportunities in private enterprise.

The work consists of general plantation labour: clearing heavy forests, cutlassing of undergrowth, lining out planting stands, planting, fitting of wire collars, labelling, ring-cutlassing and harvesting. We might put these operations in the semi-skilled category. A system of work is employed whereby a certain number of acres to be cleared, seedlings to be planted, etc., is specified at the beginning of the day as the requirement for that day; when this task is completed the labourers are free to go home. Work is carried out in gangs of twenty and upwards.

By making quantitative comparisons between present and past performance, some of the controlling factors of African labour productivity will emerge.

In addition to these striking gains in output per unit of labour, the amount of labour available at constant wage cost was increased by reductions in unexcused absence and dispensary attendance, 42% and 50% respectively. The degree of mechanisation during this period remained constant. Nor is there any reason to believe that the physical capability or skill of the labour force increased during the period. What, then, can the gains be attributed to?

It is possible to select four proximate causes. The first was a continuing increase in supervision in both its extent and in its intensity. This was achieved by management pressure on the overseers and promotion opportunities for the latter to artisan pay scales when their performance so merited. Second, concurrently tasks were enlarged. Third, greater

Index of Output per Man-day

Year.	Harvesting.	Maintenance.	Clearing and planting.
1952	100		
1953	149		
1954	130	100	
1955	190		100
1956	191		
1957	218		
1958	198	172	
1959	285	190	135

incentive, both positive and negative, were given to the workers: promotion to junior supervisory positions, closer enforcement of penalties for failure to complete task and selective dismissals during times of seasonal redundancy. Finally, improved work methods and better control contributed to increased efficiency; the first consisted in the introduction of harvesting chisels and harvesting hooks, the second in the organisation of felling heavy timber.

The above owe their origin to two more general causes. On the one hand, management accumulated experience. There was a growing awareness of the importance of labour productivity, and consequent increase in attention given to the problem at the upper levels. Financial pressures were an added stimulus. On the other hand, labour's willingness to work had increased due to wage rises totalling 35% over the seven years. Interviewing of the workers left no doubt as to this last point.[1]

The preceding analysis would suggest that the achievable productive capacity of the African worker does not in fact set the limit to efficiency, rather the way in which labour is utilised—the organisation of work and its supervision—is the crucial determinant.

The final test of African labour productivity consists of inter-firm comparisons in the rubber-processing industry.[2] As a typical industry for an underdeveloped country it is appropriate in that it represents the processing of a native raw material, requires mostly semi-skilled labour, is medium in scale (100–350 workers per firm) and is only moderately capital intensive. Rubber is also Nigeria's fastest-growing export. Rubber processing, furthermore, is susceptible to an exact productivity measurement: an undifferentiated product, brown crêpe, and but one technique of processing. All the firms are located in one geographic area and enjoy the same relative advantages concerning location of plant, quality of raw rubber, and quantity and quality of labour supply. Profit ratios were very high for the period under analysis, and consequently all firms were free to effect any change necessary for optimum efficiency.

[1] The minimum wage rose from 2*s.* 2*d.* to 3*s.* per day. Most of the workers interviewed expressed the sentiment that the present rate of pay was "too small" for any further additions to the tasks, but that if there was a wage rise they would have no trouble in completing substantially larger tasks.

[2] The results taken from a comprehensive industry study by the author.

The primary unit of measurement was man-hours worked, or man-hours required per dry ton. In order to ensure that labour was an indicative variable and that the results were no different than in the case of the scarce input, a measure of capital productivity was also taken. Three types of capital are involved: plant, equipment and operating capital. Plant includes mill housing and drying sheds. Equipment comprehends diesel engines and the rollers which actually produce the crêpe. Operating capital is required for raw rubber purchases, which constitutes 80% of the manufacturing cost; the turn-over period is three months. The three are both directly and proportionally related. Thus tons-produced-per-roller gives an accurate measure of the efficiency of capital.

The following table presents the data for five firms who account for 78% of the country's rubber crêpe production. The information is shown on a monthly basis, beginning in July 1958 and ending in December 1959. Firm I is the most efficient and Firm V the least efficient.

Inter-firm Productivity Comparisons for 18 Months

Firm I.		Firm II.		Firm III.		Firm IV.		Firm V.	
Hours/ ton.	Tons/ machine.	Hours/ ton.	Tons/ machine.	Hours/ ton.	Tons/ machine.	Hours/ ton.	Tons/ machine.	Hours/ ton.	Tons/ machine.
194	23·6	183	20·9	244	13·6	373	11·1	426	12·5
187	24·7	159	21·5	231	13·9	382	12·0	324	7·5
184	27·2	185	17·7	233	14·4	422	13·6	343	6·3
167	29·1	236	16·9	238	14·7	387	16·0	316	7·9
155	29·6	198	20·8	199	17·4	272	19·8	308	8·3
169	28·6	161	23·0	198	20·7	276	19·2	359	6·9
174	25·8	155	25·2	207	18·4	242	20·1	374	6·5
166	26·2	136	28·1	208	13·9	203	20·9	381	6·0
144	22·6	143	27·7	208	13·3	314	15·1	326	7·1
115	23·2	151	25·9	201	14·4	393	12·1	293	8·4
103	28·7	161	23·7	179	17·9	303	16·8	314	8·0
103	29·7	180	22·2	181	18·5	231	20·5	325	7·5
109	30·4	188	22·0	213	16·6	227	20·8	350	7·3
108	29·8	188	23·6	182	19·3	224	19·5	334	6·5
106	28·8	172	26·8	141	24·5	227	18·0	288	6·7
112	30·1	153	28·1	157	23·0	212	19·9	241	7·8
112	32·0	151	27·2	187	17·8	224	18·8	222	8·0
107	32·9	151	26·7	197	16·3	251	16·5	236	8·0

The most efficient producer, Firm I, is the least capitalised, that is it has substituted labour for capital more than any other firm—primarily in the materials-handling category. In addition, in terms of scale Firm I must be ranked either the smallest or second smallest, depending on the criterion used.[1]

We are thus faced with a situation in which labour varies in its productivity by as much as 311% for individual months between firms, while within a single firm variation is as high as 95%. The average difference

[1] Judged by invested capital or numbers employed, it is the smallest; judged by number of rollers, the second smallest.

in productivity between the least and the most efficient producer as measured by man-hours is 134%. The difference in productivity for these same firms on the basis of installed equipment is 267%.

The conclusion is unavoidable: low labour productivity cannot be attributed to the attitudes and capabilities of the African worker. On the contrary, where low levels of output/man prevail the burden must fall on those responsible for management and supervision of the enterprise. We have three indices which single out some of the key variables in management performance. The first is the average monthly change in the man-hours required to produce a ton of crêpe. This measurement gives us some idea of management's ability to plan and co-ordinate.[1]

Average Monthly Change in Unit Labour Requirement

	Man-hours.
Firm I	9
Firm II	17
Firm III	15
Firm IV	35
Firm V	36

The elements which must be co-ordinated and/or planned ahead several months are orders from customers, funds to provide for the required quantity of raw rubber, sufficient capacity of the physical plant in working order and recruitment of labour, particularly skilled labour.

The second indicator of management performance, daily output fluctuations for December 1959, measures three potential weaknesses: Failure to provide for continuing maintenance and for the availability of spare parts; failure to set daily production quotas which ensures that daily output will in fact approximate maximum capacity; and finally, failure to stockpile sufficient amounts of unprocessed rubber.

The graph for Firm V is deceptive, because it was operating at half capacity throughout the month. The ceiling is set on the basis of the highest output achieved that month by the individual firm, rather than on the basis of obtainable maximum output.

The third index is minimum and maximum hourly production for each day of December 1959. This is a measure of supervision.

There are three significant aspects of this graph: The average level of hourly production, the degree of fluctuation in this level and the discrepancy between minimum and maximum hours. The first measures the quality of supervision, while the second and third indicate its constancy.

[1] Monthly change in machine productivity would be preferable, since installed equipment is for our purposes an invariable input. However, the rate of utilisation is not ascertainable, *i.e.*, how many hours each day the plant was in operation for the eighteen months under analysis. A further complication is that for many months Firm V operated with only half of its equipment. This low efficiency would not be reflected in monthly fluctuations.

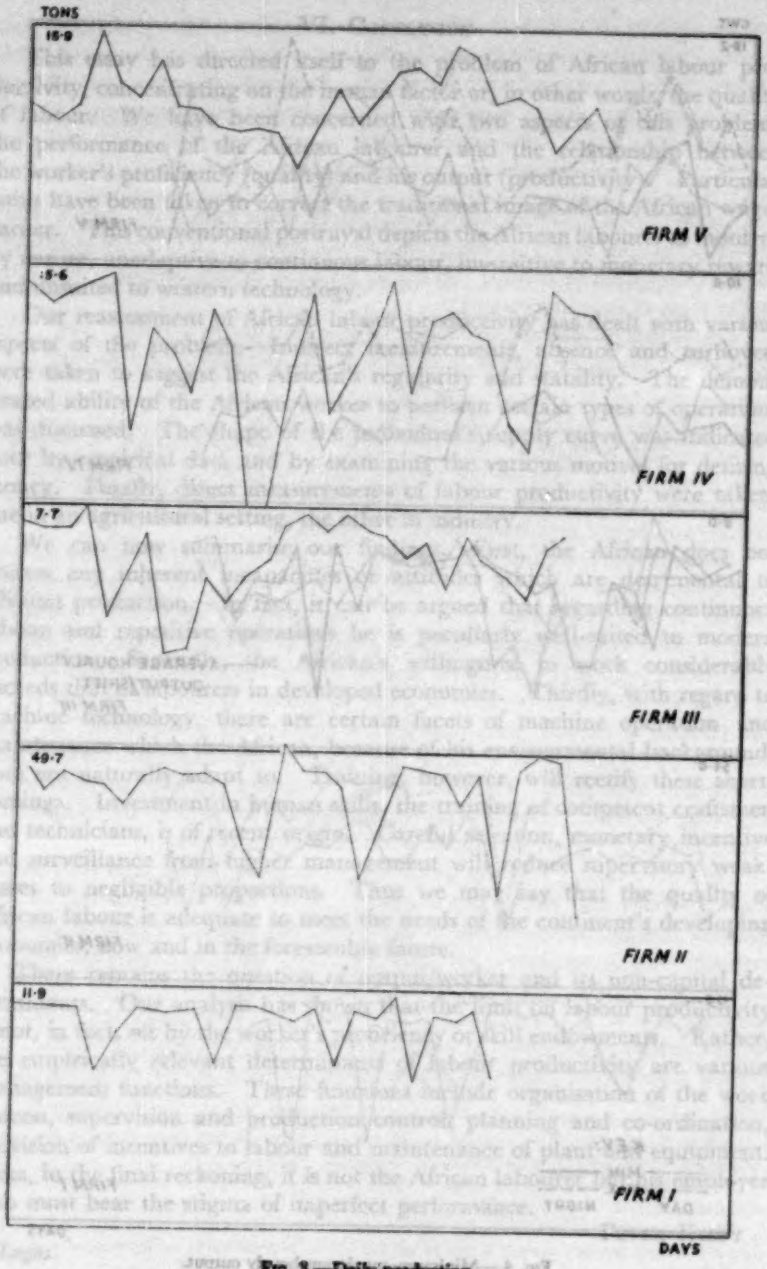

FIG. 3.—Daily production.

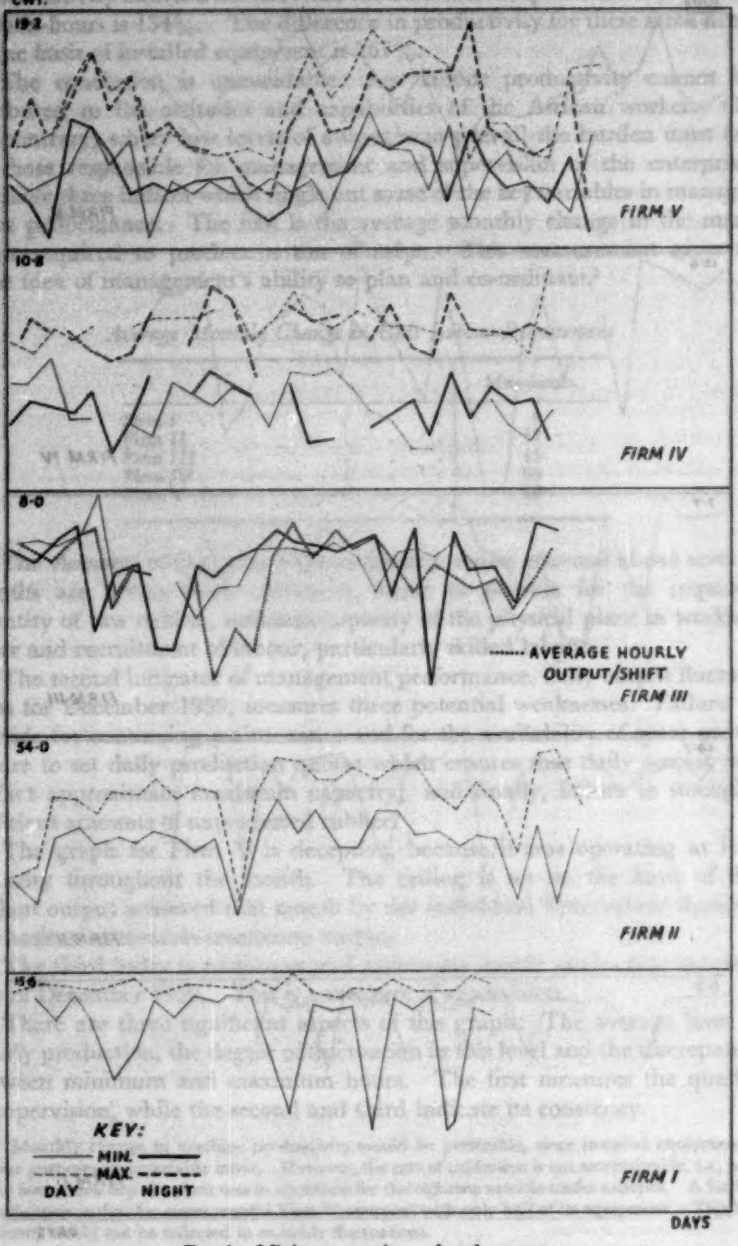

FIG. 4.—Minimum–maximum hourly output.

VI. Conclusion

This essay has directed itself to the problem of African labour productivity, concentrating on the human factor or, in other words, the quality of labour. We have been concerned with two aspects of this problem: the performance of the African labourer and the relationship between the worker's proficiency (quality) and his output (productivity). Particular pains have been taken to correct the traditional image of the African wage-earner. This conventional portrayal depicts the African labourer as indolent by nature, unadaptive to continuous labour, insensitive to monetary reward and unsuited to western technology.

Our reassessment of African labour productivity has dealt with various aspects of the problem. Indirect measurements, absence and turnover, were taken to suggest the African's regularity and stability. The demonstrated ability of the African worker to perform certain types of operations was discussed. The shape of the individual's supply curve was indicated both by empirical data and by examining the various motives for desiring money. Finally, direct measurements of labour productivity were taken, one in an agricultural setting, the other in industry.

We can now summarise our findings. First, the African does not possess any inherent incapacities or attitudes which are detrimental to efficient production. In fact, it can be argued that regarding continuous labour and repetitive operations he is peculiarly well-suited to modern production. Secondly, the African's willingness to work considerably exceeds that of labourers in developed economies. Thirdly, with regard to machine technology, there are certain facets of machine operation and maintenance which the African, because of his environmental background, does not naturally adapt to. Training, however, will rectify these shortcomings. Investment in human skills, the training of competent craftsmen and technicians, is of recent origin. Careful selection, monetary incentive and surveillance from higher management will reduce supervisory weaknesses to negligible proportions. Thus we may say that the quality of African labour is adequate to meet the needs of the continent's developing economies, now and in the foreseeable future.

There remains the question of output/worker and its non-capital determinants. Our analysis has shown that the limit on labour productivity is not, in fact, set by the worker's proficiency or skill endowments. Rather, the empirically relevant determinants of labour productivity are various management functions. These functions include organisation of the work process, supervision and production control, planning and co-ordination, provision of incentives to labour and maintenance of plant and equipment. Thus, in the final reckoning, it is not the African labourer but his employer who must bear the stigma of imperfect performance.

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TECHNICAL PROGRESS AND INVESTMENT

Introduction

The question to be discussed in this paper is the following: does a steady growth of output which is brought about not through an increase of employment but because of neutral [1] technical progress require additions to capital in the form of new investment?

The orthodox Harrodian answer to this question is a clear "yes." Indeed, the affirmative answer is implied in the fundamental equation:

$$Gc = s$$

For, if G (the rate of growth of output) is positive because of technical progress, and if c (the capital–output ratio) is constant because technical progress is neutral, then s (the savings ratio) must be positive. Thus new saving, and hence new investment, is required.

Nevertheless, one cannot escape some feelings of doubt [2] about the answer. The doubts are concerned with the following point. It is indisputable—indeed, it follows logically from the definition of "neutrality"—that, as output rises, the aggregate value of capital must rise *pari passu*. But the value of an aggregate can rise for one or both of two reasons: either because of a rise in volume or because of a rise in price. If there is to be a rise in the volume of capital, then clearly new investment is required. If, however, there is only to be a rise in the price of capital goods, then no new investment is needed. The issue under discussion reduces therefore to the following question: does neutral technical progress require additions to the capital stock or merely an appreciation of the capital stock?

As a preliminary to a discussion of this question, some brief reference to the authorities may not be out of place. As we have noted earlier, Sir Roy Harrod himself comes down to the view that neutral technical progress requires new investment, and this view has been incorporated into his theory of growth.[3] However, in a preliminary discussion of the matter he suggests that it is a question of definition—that it depends on whether a labour standard of value is chosen or a goods standard of value. If a labour standard of value is chosen, no new saving is required; if, on the

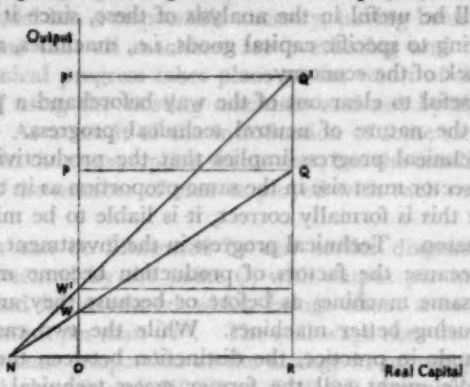
[1] In the sense defined by Harrod and followed by Mrs. Robinson. Harrod defines a neutral advance as "one which, at a constant rate of interest, does not disturb the value of the capital co-efficient" (*Towards a Dynamic Economics* (Macmillan, 1948), p. 23).

[2] I am indebted to Mr. John Black of Merton College, Oxford, for first sowing the seeds of doubt in my mind.

[3] See especially the statement on p. 83, *op. cit.*: "New capital is required in relation to new output (whether the new output is due to an increase in population or an increase of output per head)."

other hand, a goods standard is chosen, as Harrod himself prefers, an increase in the capital stock is necessary.[1] This distinction, though illuminating in many respects, does not succeed in dispelling our earlier doubts; because it is possible to follow Harrod in using a goods standard of value and still to hold that the increase in the capital stock is brought about by an appreciation of its value rather than by new additions to it.

Mrs. Robinson does not explicitly discuss the question at issue. For her, smooth development with neutral technical progress requires that "the stock of machines (in terms of productive capacity) is growing at the rate appropriate to the increase in output per man that is taking place,"[2] but she does not, unless I have missed it, go on to discuss whether this increase in the stock of machines is brought about by an appreciation of the value of machines or by an accumulation of new machines. On the other hand, much that she has written[3] is, of course, very useful and relevant to the question at issue. In particular, she has provided a diagrammatic treatment which can be used not only in summarising the analysis so far but also in the further development of the analysis to be carried out in later sections of this paper. The diagram below is adapted from hers.[4]



In the diagram we measure output per man on the vertical axis and real capital (the value of capital in terms of wage-units) per man on the horizontal axis. Since we are throughout considering the labour force as constant, our two axes can equally well represent total output and total real capital respectively. Suppose initially that the real wage is OW, and that the values of output per man and of real capital per man are given by the point Q (*i.e.*, output per man is OP and real capital per man is OR). Then we have at once that the value of capital per man in terms of goods is $OW.OR$; and that the rate of profit on capital is $WP/OW.OR$ (by similar triangles,

[1] *Op. cit.*, pp. 26 *et seq.* (especially p. 30).
[2] *Accumulation of Capital* (Macmillan, 1956), p. 89.
[3] Mainly in Chapters 9 and 16.
[4] P. 419.

this is also equal to $1/ON$). Now consider an increase in output per man due to neutral technical progress. The conditions of neutrality are that, for a constant rate of interest (rate of profit) on capital, the capital–output ratio is also constant. This implies that, for any value of OP, $WP/OW.OR$ and $OW.OR/OP$ are both constant. Since $OP = OW + WP$, it follows that both OW/OP and OR are constant. Thus, neutral technical progress means a change from a point Q to a point Q' (vertically above Q), while the real wage rises in the same proportion as output per man.

The above analysis is based on that of Mrs. Robinson, and it serves to bring out Sir Roy Harrod's point concerning the standard of value chosen. If a labour standard is chosen, *i.e.*, if capital is measured in wage-units, then no increase in the value of capital is required by neutral technical progress. If, on the other hand, a goods standard is chosen, then the value of the capital stock must rise in the same proportion as output per man. So far, however, little light has been shed on the question under discussion, whether the rise in the goods value of capital is due to an appreciation in the value of capital or to new additions to capital. To proceed further, it will be necessary to develop special models of technical progress, though the diagram above will be useful in the analysis of these, since it can be reinterpreted as referring to specific capital goods, *i.e.*, machines, as well as to the total capital stock of the economy.

It will be useful to clear out of the way beforehand a possible misconception about the nature of neutral technical progress. It is often said that neutral technical progress implies that the productivity of labour in the investment sector must rise in the same proportion as in the consumption sector.[1] While this is formally correct, it is liable to be misinterpreted for the following reason. Technical progress in the investment sector can come about either because the factors of production become more efficient at producing the same machines as before or because they are as efficient as before at producing better machines. While the two cases may not be easy to disentangle in practice, the distinction between them is important analytically. We might call the former *proper* technical progress in the investment sector, since in the latter case the technical progress in the investment sector is *derived* from the greater efficiency of machines in the consumption sector. If there is a rise in output per man in the consumption sector due to neutral technical progress in that sector, the required similar rise in output per man in the investment sector will be automatically derived in the above sense, and no proper technical progress in the investment sector will be necessary. Indeed, proper technical progress in the investment sector will, *ceteris paribus*, tend to have a capital-saving effect for the economy as a whole.

Three separate models will be considered in the following three sections. First of all we shall consider the case in which technical progress takes place

[1] Cf. Harrod, *op. cit.*, p. 23; Joan Robinson, *op. cit.*, p. 87.

though capital does not wear out or become obsolete. Secondly we shall consider the case in which capital has continually to be replaced, the replacement being necessary because of depreciation and not because of obsolescence. Finally we shall consider technical progress and obsolescence.

In order to simplify matters, we shall assume in the first instance that machines are made entirely by hand and that all machines take the same number of labour-hours to produce. In this way, attention can be confined to the rise in output per man in the consumption sector, since the rise in output per man in the investment sector will be entirely of the derived kind. The consequences of relaxing some of these assumptions will be discussed in a later section, in which special consideration will be given to proper technical progress in the investment sector.

Technical Progress without Depreciation or Obsolescence

We might call this model the model of "pure" technical progress—pure in the sense that the technical progress does not get mixed up with the question of replacement due to depreciation or obsolescence. Though artificial, the model has a respectable ancestry, having been used by Wicksell.[1] We assume that all machines are everlasting and do not become obsolete. Technical progress takes place as the result of the invention of new methods of using the existing machines and not by the invention of new machines. As a result of the introduction of some new method, the output per man in the consumption sector rises, but the condition of neutrality requires that the number of men employed with each machine remains constant.

The position can be illustrated by our earlier diagram. The initial situation is represented by the point Q, with output per man OP. Then some new method is introduced which brings about a movement to the point Q', with output per man OP'. The real wage rises from OW to OW', a change in the same proportion as the change in output per man. The value of capital rises from $OW.OR$ to $OW'.OR$, but this change is due entirely to the change in the real wage. Since the technical progress has come about as a result of the adoption of a new method of using existing machines, it is clear that no additional machines are required.

The answer to our question in the case of this particular model is therefore unequivocal. The rise in the total value of capital is due entirely to an appreciation in the price of machines as a result of the rise in the real wage. No new investment is required, since additional machines are not needed.

Unfortunately, once we take the first step towards realism by introducing

[1] Wicksell used the model to analyse the effect of improvements in the use of land (*Lectures* (Routledge, 1934), Vol. I, pp. 133 *et seq.*). It may well still have some application in this connection.

depreciation, we no longer achieve the same clear answer, and we are once again caught up in questions of definition.

Technical Progress with Depreciation

In this model we suppose that all machines wear out after a given number of years. Technical progress takes place because, as each machine is scrapped, it is replaced by an improved machine. The same amount of labour is employed in combination with the new machine, but the output per man of consumption goods is increased.

The position of any particular firm can be represented on our diagram. We suppose that the firm has been operating with a machine whose original cost was *OW.OR*. After a given number of years the machine wears out and is replaced by a new and improved machine. But, in the meantime, as a result of technical progress having taken place in other firms, the real wage has risen from *OW* to *OW'*. Thus the cost of the new machine is *OW'.OR*. The question then arises: does the replacement of the old machine by the new improved machine represent new investment on the part of the firm or merely an appreciation in the value of its capital?

The answer would seem to depend on how one measures the depreciation on the old machine when it wears out. On the one hand, if one measures the depreciation by the *original* cost *OW.OR* of the machine, then the firm can be said to have carried out net investment to the extent of *WW'.OR*. If, on the other hand, the depreciation is measured by the *replacement* cost of the machine, then no net investment is carried out by the firm when it replaces it by an improved machine. For, as a result of the rise in the real wage, the replacement cost of the old machine has risen to *OW'.OR*, even though the machine is in fact replaced by an improved machine also costing *OW'.OR*. Thus the question whether neutral technical progress requires new additions to capital or merely an appreciation in the value of capital turns out in this model to be a matter of definition—it depends on whether one measures depreciation by original cost or replacement cost.

Can anything be said in favour of the one measure of depreciation rather than the other? Two considerations seem immediately relevant here. On the one hand, the choice of replacement cost gives the same answer in this case as in the case of "pure" technical progress discussed in the previous section, and this would seem to be an advantage. On the other hand, the choice of original cost must be made if Harrod's fundamental equation is to apply to growth due to neutral technical progress as well as to growth due to a rise in employment. Neither of these considerations would appear to be decisive. The case of "pure" technical progress is too artificial and unrealistic to have any very great claims on our attention. At the same time, there seems no reason why Harrod's fundamental equa-

tion should not be amended so as to refer only to the growth of output due to a rise in employment.

On the choice of the measure of depreciation will depend the behaviour of net investment as neutral technical progress takes place. It would seem sensible at this point to inquire into the behaviour of gross investment in such a case. On the whole, we should not want to choose our measure of depreciation in such a way as to make net investment behave in a fundamentally different way from gross investment, unless there are special reasons for expecting the one to behave differently from the other. An example of such a reason would be a more rapid rate of replacement brought about as a result of more rapid obsolescence; but we have deliberately postponed any consideration of obsolescence until the next section. So long as we retain the assumption of a given working life for a machine, the behaviour of gross investment is quite straightforward. As output rises, gross investment will rise *pari passu*, because of the rise in the real wage and thence in the cost of new machines. But there will be no tendency for gross investment to depend of the *rate of increase* of output. It would therefore seem inappropriate to measure depreciation in such a way as to make net investment depend on the rate of increase of output. For this reason, I am inclined to think that the replacement cost measure is the more suitable one, and that Harrod's fundamental equation ought to be amended accordingly.[1] But the force of this argument will be somewhat weakened when we relax our restrictive assumptions.

Technical Progress with Obsolescence

It is to be expected that neutral technical progress will speed up the rate of replacement of machines as a result of more rapid obsolescence. So long as we measure depreciation by the replacement cost of machines, the position of net investment will not be affected. It will still be the case that neutral technical progress requires no addition to capital in the form of net investment. Gross investment, on the other hand, will be greater the more rapid is the rate of replacement. In so far as technical progress alters the rate of replacement, the ratio of gross investment to output will depend on the rate of technical progress.

Proper Technical Progress in the Investment Sector

The earlier assumption that all machines cost the same number of labour-hours to produce ruled out the possibility of proper technical progress in the investment sector. Since there is no reason why such technical progress should not take place in the investment sector just as much as in the consumption sector, we cannot avoid considering it, even though it

[1] Harrod himself discusses the question of depreciation, but he relates it to the choice of the standard of value (*op. cit.*, pp. 31–2). It is perhaps an additional reason in favour of the replacement cost measure that it gives the same answer whatever the standard of value chosen.

introduces considerable complications into the analysis.[1] The trouble arises because proper technical progress in the investment sector tends to reduce the cost of machines and thereby to have a capital-saving effect on the economy as a whole. This means in turn that it must be balanced by capital-using technical progress in the consumption sector if the technical progress for the economy as a whole is to remain neutral. The capital-using technical progress in the consumption sector will clearly require some net investment; and this will be matched, not by net disinvestment in the investment sector, but rather by the failure of the price of machines to rise by the full extent of the rise in the real wage. In this case, therefore, neutral technical progress for the economy as a whole will require some net investment to sustain it. But the net investment required will not be related to the rate of growth in any simple way: it will depend on the extent to which proper technical progress is taking place in the investment sector.

On the other hand, the behaviour of gross investment is unaffected by proper technical progress in the investment sector. Although the output of machines has to be increased, the effect of this is exactly counterbalanced by the fall in the labour-cost of machines. As before, gross investment will rise *pari passu* with output, but will not depend on the rate of growth of output, so long as the working life of machines is given.

Conclusions

It is not easy to put the results of the analysis of the preceding sections into a convenient summary form. Indeed, there is a good deal to be said for considering only gross investment and not net investment when the theory of growth is being tackled, since the treatment of gross investment is not only more straightforward but also less dependent on matters of definition. Nevertheless, some generalisations about net investment can, I think, be made, once the definitional issue is settled. In what follows we shall continue to measure depreciation by replacement cost and not by original cost.

A distinction has to be made first between neutral technical progress and neutral inventions. Neutral technical progress may be taken to refer to the economy as a whole, while a neutral invention refers to a particular line of production. From the analysis of the last section, the important conclusion emerges that a number of neutral inventions do not together constitute neutral technical progress, unless the inventions are confined to the consumption sector. So long as there are any inventions at all in the investment sector, then neutral technical progress requires that on balance inventions should be capital-using.

It is possible to reach very much firmer conclusions for inventions than for technical progress. For the reasons advanced in the last section, it is unsafe to apply the results of our earlier simplified models to technical

[1] I am indebted to Mr. J. Dixon of St. Edmund Hall, Oxford, for having made this clear to me.

progress in the economy as a whole. They can, however, be applied with some confidence to inventions in particular lines of production.[1] Thus, our conclusions can be stated as follows:

1. A neutral invention does not require any net investment for its implementation;

2. Neutral technical progress may, and generally will, require some net investment; but this need, when it arises, is due to the capital-using character of the inventions that constitute the neutral technical progress.

It is tempting to relate the foregoing analysis to the problem of how to raise the rate of growth of output per man in the United Kingdom to-day. It is often argued that this rate of growth will be increased only if the proportion of income devoted to investment is considerably raised. There is nothing in the above analysis that contradicts this view, which on the whole I share. What the analysis can be claimed to have done is to have made clearer the role of investment in technical progress. It is perhaps safer to consider gross investment here, since net investment depends, as we have seen, on the treatment of depreciation. A higher ratio of gross investment to gross national product is required either to raise output per man by a process of "deepening," *i.e.*, by raising the capital–output ratio; or it may be required in order to keep pace with a more rapid rate of replacement because of obsolescence. There seems to be no place, however, for a higher ratio of gross investment to gross national product simply in order to sustain an enhanced rate of technical progress which is neutral and which does not speed up the rate of replacement.[2]

A final word on a methodological point may be in order. Mr. Kaldor has recently contended[3] that it is unnecessary to distinguish between the effects on the capital stock of accumulation, on the one hand, and of invention, on the other. Our analysis shows, I think, that this view can hardly be sustained. While certainly it is difficult to make the distinction in practice, it still seems important that we should try to do so. Accumulation requires investment; neutral invention, except in so far as it speeds up the rate of replacement, does not. This is surely a matter of some importance.

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[1] Mrs. Robinson's diagram can be used to refer to a particular line of production in the investment sector as well as in the consumption sector. Clearly, our earlier assumption that all machines are made by hand and take the same number of labour-hours to produce cannot be retained; but it can be replaced by an assumption that the cost of the machines used as factors of production in any one line of production remains constant in terms of wage-units (labour-time). The only troublesome case is that in which a machine is both product and factor in the same line of production. Even this case can be handled if we arbitrarily assume that the labour-cost of the machine as factor of production remains constant when the criterion for neutrality is being applied.

[2] I am referring here only to investment in physical capital and not to investment in research, which may, of course, be an important means of accelerating technical progress.

[3] "A Model of Economic Growth," ECONOMIC JOURNAL, December 1957, p. 595.

THE "NEUTRALITY" OF IMPROVEMENTS

THE following note does not traverse that by Mr. Kennedy, nor affect the main part of his analysis distinguishing between different types of improvement. But since Mr. Kennedy has commented on my views, this may be the appropriate place to meet a recurrent criticism of my definition of "neutrality." I still believe that the one I have provided[1] is the most workable one. Objection has been made because it is taken to imply an infinitely elastic supply of capital, and this is taken to be a special case and therefore a short-coming in a definition required for universal application. I believe that this thought has hindered the general acceptability of my definition. Unfortunately in *Towards a Dynamic Economics* I wrote, "in the language of statics this implies an infinitely elastic supply of capital at the existing rate of interest."[2] In earlier passages I had stressed that the concepts of statics were inappropriate for use in this connection, but in the sentence quoted I did not underline "in the language of statics," which might have put the reader on his guard against the view that I was really meaning to posit infinite elasticity. It is to be confessed that the remainder of this paragraph suggests that I was accepting Keynesian optimism in regard to the supply of capital; and perhaps I was indeed doing so.

A good definition of neutrality should make it a serviceable tool, both for the theoretical analysis of the consequences of improvements being labour saving, neutral or capital saving, and for the guidance of economic policy in relation to the occurrence of improvements in either of the three categories. For the second purpose at least, and perhaps for the first also, it is important that a given improvement should be identifiable as belonging to one or other of the three categories from its own intrinsic nature, without reference to extrinsic matters, such as elasticities of substitution between capital and non-capital factors in other industries. But also, if a definition is to be generally acceptable, it must fulfil some minimum requirements of symmetry and conceptual tidiness.

My definition of neutrality was that it should not disturb the length of the productive process.[3] This concept of the "length of the productive process" has not always been popular, but I submit that it is the most fundamental concept in defining the quantum of capital. Perplexities arising from the fact that the capital embodied in any product may stretch back into a past of indefinite duration need not worry us, because an infinite series can be summed. This definition carries a corollary, which is itself conceptually acceptable, that, if the rate of interest is unchanged in conse-

[1] *Towards a Dynamic Economics*, p. 23. [2] P. 27. [3] P. 24.

quence of the improvement, the *share* in the total product going to capital remains unchanged. Some may be liable to fall into the mistake of supposing that, if shares are to be unchanged, the rate of interest must rise in the same proportion as wages (or rewards of other non-capital factors). That the contrary is the case can easily be seen. If the rate of interest is unchanged and the length of the productive process is unchanged, the proportion of the value of the final product that is to be assigned to interest is unchanged; *i.e.*, the share of capital is unchanged.

It might be held that conceptual tidiness also requires that the quantity of capital should be supposed to remain the same after, as before, the improvement. It is at this point that my alleged requirement for an infinitely elastic supply of capital at a given rate of interest might come in for criticism.

By one criterion for measuring the "quantity of capital," and that perhaps the one most commonly adopted, certain awkwardnesses can arise. By this criterion the quantity of capital is measured as the average time of waiting multiplied by the number of baskets full of goods in respect of which there is waiting, which may be alternatively represented as the average number of baskets full of goods in the pipe-line at any moment. If the average length of the productive process, *i.e.*, the average length of time elapsing between each input, where each is weighted by its value, and the output, remains unchanged, and if there is an improvement, *i.e.*, an increase in the number of baskets full of output consequent on a given input, the quantity of capital, *as defined above*, must increase. This gives rise to the awkwardness aforementioned. If, however, the criterion for measuring the quantity of capital is stated in a variant form, which I believe equally sound, or better, this awkwardness can be removed, and the requirements for symmetry and conceptual tidiness can be fully satisfied (see below).

I criticise the view that symmetry and conceptual tidiness require the quantity of capital, *as defined above*, to remain unchanged, on the following grounds.

1. This view works with a static concept.[1] This is inappropriate. All definitions used in an analysis of the effects of net improvements should be framed in dynamic terms. Thus, what we require is not that the quantity of capital should remain unchanged, but that it should be increasing at a normal rate in some sense (see below).

2. If, nonetheless, it is insisted that the definition of neutrality must refer to what happens supposing the quantity of capital to be unchanged, it should be noted that any invention whatever, whether labour saving, neutral or capital saving, must, owing to the insufficiency of capital after the improvement has been made, shorten the length of the productive process. For, if the length of the productive process was not shortened and the final output of end goods was increased, the goods in the pipe-line must increase.

[1] This criticism was made in *op. cit.*, p. 25.

Therefore a neutral invention, however that be defined, must on this condition shorten the length of the productive process. This seems to violate a more important requirement for a conceptually satisfying definition of neutrality. Furthermore, if the rate of interest is unchanged, it follows as a corollary that the share of capital must be reduced by any improvement whatever. This violates another important criterion for neutrality.

3. To meet the last-mentioned point, but not the first, it might be argued that with a neutral invention we must allow a rise in the rate of interest. If the rate if interest rose by the right amount this would offset the shortening in the productive process and secure to capital the same share in the final product as before.

This way of meeting the case is objectionable, because it makes the criterion of neutrality depend on a wide range of facts and is therefore difficult to apply in any particular case. By my definition one merely has to examine the nature of the improvement itself and see whether it raises or lowers the interest charge (at a constant rate of interest) as a proportion of output. On the contrary, on the definition now under consideration, in order to discover on which side of neutrality the improvement lies, one has to know also the elasticity of substitution of capital for other factors, not only in the case of the product itself, but also throughout industry. Thus, this definition would render the concept of neutrality an altogether unserviceable tool.

I therefore suggest that, *for this purpose and in this context*, in order to obtain the required symmetry and conceptual tidiness, we should measure the quantity of capital in a different way. The quantity of capital should be measured by the average time of waiting multiplied by the number of man hours (or other non-capital factors of production as currently valued in terms of man hours) in respect of which there is waiting. This way of measuring the quantity of capital, although not serviceable for all purposes, is just as natural as, and perhaps more fundamental than, the other way of measuring it.

By this mode of measuring capital, my definition of neutrality fulfils the requirement that the quantity of capital be supposed to remain unchanged. If the average length of the productive process is unchanged, the quantity of capital so measured will be unchanged, however much the non-capital factors, in respect of which there is waiting, rise in goods value. Also, with the rate of interest unchanged, the share of capital will remain unchanged. Thus, this definition allows us to assume that the quantity of capital remains unchanged, and it thus fulfils all requirements for symmetry and conceptual tidiness even within the limitations of static concepts.

We have reached this satisfactory conclusion without any reference to the monetary system which the economy actually uses. It may be objected that, despite all that has been said, there will be awkwardness if accountants measure capital in a different way. It is at this point, and

at this point only, that the question, rightly introduced by Mr. Kennedy, of what monetary system we actually use, becomes relevant. My definition will be quite conformable with what accountants do in measuring capital, if we have a system in which prices fall in proportion to the increase of productivity (factor rewards remaining constant). In that event accountants will in effect measure capital, *e.g.*, in comparing the quantity of capital at t_0 with that at t_1, by the number of units of factors in respect of which there is waiting, and not by the number of baskets full of goods in the pipe-line. The same result would be achieved if accountants measured capital by replacement costs.

But if prices are constant and factor rewards rising, accountants will not measure capital in this way. We then have to say that, if we measure capital as the accountants do, and if improvements are neutral on balance, then, to keep the length of the productive process the same and the share of capital the same, there must be some new net saving, which raises the stock of capital at the same rate as current output. If improvements are capital-requiring, more saving than that will be required and, if they are capital-saving, less.

We may now return to dynamic concepts. We have already seen that, in place of the supposition that the quantity of capital remains the same, we require some postulate such as that the quantity of capital is increasing at a normal rate in some sense. When we do this, my formulation, which has caused such unfortunate misgivings, namely that the supply of capital must be supposed to be infinitely elastic over the required range at a constant rate of interest, disappears from view completely. The dynamic analogue of the static requirement that the quantity of capital remains unchanged can be taken in one of two ways. If we define a unit of capital as so much waiting in respect of a unit of non-capital factors of production, then it should be supposed that the quantity of capital is growing at the same rate as the non-capital factors of production. If, on the other hand, we define a unit of capital as so much waiting in respect of a basket full of goods in process, as it might be convenient to do if the monetary system is one of constant prices and rising factor rewards, then it should be supposed (as the dynamic analogue of the static concept) that capital grows at the same rate as income. Either way our system meets all requirements of symmetry and conceptual tidiness.

From this firm basis we can proceed to analyse the consequences of the actual increase of capital being greater or less than that supposed, or of the improvements being on balance biased towards capital-requiring or capital-saving. Above all, we can regard each improvement on its own merits without having to refer to elasticities of factor substitution in its own industry or in other industries.

The expressions capital–labour ratio and capital–output ratio have become popular. If capital is defined as so much waiting per unit of non-

capital factors (as would conform with accountancy when product prices fall with productivity), a neutral improvement in my sense would leave both the capital–output ratio and the capital–labour ratio intact. But if capital is defined as so much waiting per basket full of goods (as would conform with accountancy when prices are constant), a neutral improvement would leave the capital–output ratio intact, but increase the capital–labour ratio.

Finally, it may be noted that, if accountants measure capital in money terms, then, of whatever kind improvements may be on balance, more new net saving will be required to finance them in a regime of stable prices than in a regime of falling prices.

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TWO PROPOSITIONS IN THE THEORY OF INDUCED INNOVATIONS

THIS note is intended to establish a presumption for the existence of an adjustment mechanism which in market economies directs inventive activity into more or less labour-saving (less or more capital-saving) channels, according as one or the other factor of production is getting relatively scarce on a macro-economic level. On the conventional static equilibrium assumptions for firms which are very small in relation to the economy, it would be inconsistent to assume the existence of such a mechanism. On these assumptions macro-economic resource-scarcities express themselves to the individual firms exclusively in the ruling factor prices, none of which is either "high" or "low" in relation to the marginal productivity of the resource. Consequently, the firm is not interested in whether any given product-raising or cost-saving effect is achieved by raising primarily the marginal productivity of the one or of the other factor of production. However, the point to be argued here is that this negative conclusion must be qualified significantly—indeed, loses its validity for pronounced scarcities—if we make the assumptions slightly more realistic.

The writer has presented a more detailed analysis of the problem at a conference on inventive activity, but while the note that follows here is less complete in several respects than the conference paper in question, it is more specific about some propositions whose relevance now seems greater to the writer than it did earlier.[1]

In Figs. 1 and 2 the simplifying assumption is made that labour and capital are the only factors of production. Each technology is defined by isoquants. Economies of scale are disregarded, since their effects on the preference for labour-saving versus capital-saving inventions is unpredictable (hence these economies may be viewed as having a random influence). The relative factor prices, which must be known before the iso-cost functions can be drawn, may be interpreted as "the real wage-rate" and "the interest rate," that is, as the money price of hiring workers, and as the cost of borrowing capital (or of renting capital goods of given money value), where the price of the final output is assumed as given. Sir Roy Harrod called my attention to the fact that, contrary to frequent

[1] The more detailed analysis, which was recently presented at a conference in Minneapolis, will be published in a volume of the National Bureau of Economic Research. Both propositions to be developed in this note below—the proposition concerning the "learning process" and the proposition concerning monopsonistic imperfections—are elaborations on hypotheses expressed in the writer's *Trends and Cycles in Economic Activity* (New York: Henry Holt, 1956). Professor H. A. J. Green has rightly pointed out that the presentation of these propositions in my *op. cit.* needed a more detailed explanation (see his excellent article in ECONOMIC JOURNAL, March 1960, pp. 57–73). The presentation of the first proposition (see Fig. 1, *infra*) has greatly benefited from discussions I had with Mr. Richard R. Nelson of the Rand Corporation.

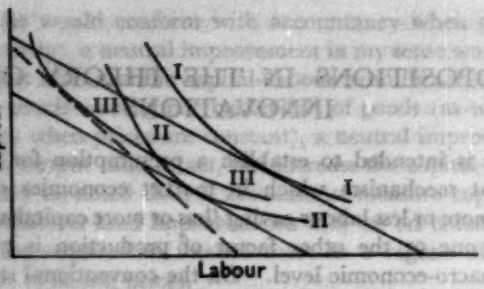

Fig. 1. Perfectly Competitive Factor Hiring.

Legend. All three isoquants of the firm relate to the identical quantity of output. The fully drawn straight lines are the iso-cost lines as of "now." Isoquant I describes the old technology. The firm must choose between making an effort to develop (acquire) "innovation" II or III. Given the factor-price ratios expressed by the present iso-cost lines, Technology II is superior to III. But if (as is the case in Western economies) a gradual increase in real wage-rates relative to interest rates is anticipated (see the broken iso-cost), then the firm expects that III will *in the future* become superior to II. Thus, whatever the length of the relevant periods is for which investment decisions are made, *it may be preferable to establish III rather than II*, provided that it is necessary to make a substantial allowance for the possibility that no further invention and innovation will become available during the subsequent periods. The argument gains in strength if II and III are nearly equivalent at present factor prices. Note that III is more "relatively labor-saving" than II. This is true on micro-economic grounds because for any given factor-price ratio the firm uses III with a smaller labour–capital ratio than II. Viewed macro-economically, III is more relatively labour-saving than II because if, given the macro-economic quantities of input, many firms use III the wage-rate is lower relative to the interest rate than if many firms use II. Hence the argument here points to a labour-saving bias in circumstances where real wage-rates are expected to rise relative to interest rates. As here drawn, innovation II could be defined as "neutral" and III as "labour-saving," but what matters for the argument is merely that III should be more labour-saving than II and that they should intersect.

practice, it is wrong to take it *generally* for granted that in models of this sort a change in money wage-rates relative to interest rates will lead to a change in the capital–labour ratio; yet I shall explain in a footnote why I believe that for my specific purpose this result may indeed by taken for granted.[1]

[1] The difficulty which in analysis of this sort needs to be watched is the following. If money wage-rates change (say, rise) *but the rate of interest does not change* (say, does not decline), then this does not *necessarily* provide an inducement for using methods of greater capital-intensity. The result may simply be that all prices, including those of the capital goods, rise in the same proportion as the money wage-rate, and hence the price of real "capital disposal," as well as the real wage-rate, stay unchanged. However, the reasoning in the present note will always imply assumptions on which it is legitimate to conclude that a change (say, a rise) in money wage-rates relative to interest rates does make it profitable to use methods of greater capital-intensity. This is because if the supply of capital rises relative to that of labour *along given production functions*, then interest rates do decline (and, of course, real as well as money wage-rates rise). If, on the other hand, the rise of the supply of capital relative to that of labour is accompanied by *technological progress*, then the rate of interest need not decline; yet even in this case unrealistic assumptions would have to be made with respect to extremely labour-saving innovations to arrive at the conclusion that real wage-rates will *not* rise. It seems quite appropriate to assume that in such circumstances a rise in money wage-rates expresses at the same time a rise in *real* wage-rates (say, with a constant price level); and if with a constant price level money and real wage-rates rise relative to interest rates, then this does make it profitable to use more capital-intensive methods of production.

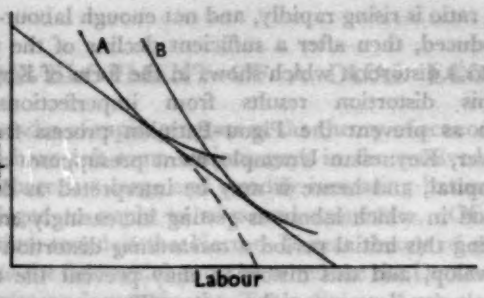

Fig. 2. Monopsonistic Imperfection.

Legend. Isoquants A and B relate to the same output. Technology A is more relatively labour-saving than B (see Legend under Fig. 1). The slope of the fully drawn iso-cost line expresses the factor-price ratios in the event of perfectly competitive factor hiring. In this case A and B appear equally desirable to the firm. Hence, both processes will be developed and used in the economy. However, if a "monopsonistic" imperfection raises the wage-rate relative to the rate of interest whenever the firm increases its labour input, A becomes superior to B. The monopsonistic imperfection is here illustrated with the aid of an iso-cost line, which in the neighbourhood of the ordinate coincides with the fully-drawn line, but further down continues along the "broken" path. Firms are here regarded as seeking (at a cost) innovation A or innovation B.

To save space I deduced the two central propositions of the argument in the Legends appearing under the two graphs. In the text of this note I shall attempt to express the meaning of these two propositions briefly in more general terms.

The meaning of the first proposition (see Fig. 1) is that in some cases a preference may develop for inventions which are particularly factor-saving in the resource that is getting scarcer, because a *learning process* may induce atomistic firms to behave as if they were big enough to notice that *macro-economically* the factors of production are *not* in infinitely elastic supply. To be more specific, in Western economies, in which the supply of capital is expected to rise in a higher proportion than the supply of labour, a labour-saving invention which at present is inferior to a capital-saving invention may in due time become superior to the latter; and this is a macro-economic fact which the atomistic firm can *learn* by watching trends in factor prices. However, firms will, of course, give preference to a now inferior labour-saving invention over a now superior capital-saving invention only if they wish to make a substantial allowance for the possibility that no important further invention will be available for some time. This is because for any given period the superiority or inferiority of an invention to the atomistic firm does not depend on whether the invention is relatively labour-saving or capital-saving.

The meaning of the second proposition (see Fig. 2) is that distortions or "market imperfections" of certain kinds may call forth market imperfections of a different kind which counteract, or in some cases wholly neutralise, the initial distortion. If, for example, the macro-economic

capital–labour ratio is rising rapidly, and not enough labour-saving innovations are introduced, then after a sufficient decline of the profit rate this is apt to lead to a distortion which shows in the form of Keynesian Unemployment. This distortion results from imperfections—money-wage rigidities—such as prevent the Pigou–Patinkin process from going into effect. However, Keynesian Unemployment presupposes a low marginal efficiency of capital, and hence it may be interpreted as developing after an initial period in which labour is getting increasingly *scarce* relative to capital.[1] During this initial period a *counteracting* distortion (imperfection) is likely to develop, and this distortion may prevent the relative labour scarcity from turning into unemployment. The counteracting distortion is a consequence of the fact that in a situation of appreciably growing relative labour scarcity the individual firm is usually unable to hire additional labour of given qualities at unchanging wage-rates (an excess demand for labour of various kinds may exist for an extended period) and in these circumstances the individual firm does have reason to prefer labour-saving to capital-saving innovations. Technically, the reason is that in such circumstances even a small firm is in a quasi-monopsonistic position, since resources are not in infinitely elastic supply to the firm. If for this reason innovating activity becomes sufficiently slanted toward the labour-saving effect, the induced labour-saving slant may put an end to the relative labour scarcity and the phase of Keynesian Unemployment may thus be indefinitely postponed.

Similarly, if innovations become *too* labour-saving, and if for this or any other reason a relative shortage of *capital* develops,[2] the individual firm finds itself in a quasi-monopsonistic position in the capital market, and innovating activity may become directed into more capital-saving channels.

There is reason to assume that in those countries in which a genuine innovating process has originated, the character of innovating activity adjusted reasonably well to basic resource positions. I would like to suggest that this is unlikely to have been entirely the result of an historical accident.

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[1] The type of unemployment with which the Keynesian theory is concerned has the "paradoxical" feature that it results indirectly from a labour supply which is *too small* to prevent the marginal efficiency of capital from falling to a critical level. It is this initial shortage of factors co-operating with capital which then turns into an excess supply of labour (because in the absence of the Pigou–Patinkin effect investment becomes insufficient to match savings at full employment). The other type of unemployment, which is usually attributed to the insufficiency of the capital stock (either because the labour supply is rising at a higher rate than the capital stock or because innovations become extremely labour-saving) does *not* have this "paradoxical" feature. This second type of unemployment may be explained directly with reference to the fact that given the size of the capital stock, the marginal productivity of the fully employed labour force would be smaller than the ruling wage-rate.

[2] Given a floor to real wage rates, such a shortage of capital can create the second type of unemployment discussed in the preceding footnote.

THE DEVELOPMENT OF A DUAL ECONOMY[1]

1. Two decades of rapid progress in the theory of economic growth and development[2] have left some curious gaps in the received doctrine. On the one hand there is a large and steadily increasing battery of theories or "models" alleged to apply to advanced economies. Of these the most familiar and time-tested is the Harrod–Domar theory of growth.[3] Three recent entries to the field which must be noted are the Duesenberry–Smithies model[4] of cycles and growth, the Tobin–Solow "neo-classical" growth model[5] and the Kaldor model of growth.[6] Of course, this is only part of the array of theoretical devices now available to students of growth in advanced economies.[7] Whatever the differences among these growth theories, they share one distinctive feature: The analysis throughout is on the highest level of aggregation. There is assumed to be a single commodity and a single producing sector. On the other hand, there is a smaller number of theories of development for backward economies. Most important among these contributions, from a theoretical point of view, is the recent work of Leibenstein,[8] carrying forward the program of creating an economic-demographic theory of development.[9] As in the theory of growth for an advanced economy, the analysis is carried through on a level of aggregation which permits only one output and a single production relation. The differences between the theory of growth (for advanced economies) and the theory of

[1] Paper read to Nicholas Kaldor's seminar on the economics of growth at the University of California, Berkeley, March 8, 1960. I am much indebted for comments and criticism to the members of the seminar, especially Mr. Kaldor and F. H. Hahn. Neither of these is, however, to be held responsible for any remaining deficiencies or for the views expressed here. I am also indebted for helpful advice and for discussions of the problems treated in this paper to my colleagues Harvey Leibenstein, Roy Radner and Henry Rosovsky.

[2] Dating the beginning of serious work in this field with R. F. Harrod's "An Essay in Dynamic Theory," Economic Journal, Vol. 49, 1939, pp. 14–33.

[3] Harrod, *ibid.*, and *Towards a Dynamic Economics* (London: Macmillan, 1948); E. D. Domar, "Capital Expansion, Rate of Growth, and Employment," *Econometrica*, Vol. 14, 1946, pp. 137–47.

[4] J. S. Duesenberry, *Business Cycles and Economic Growth* (New York: McGraw-Hill, 1958); A. Smithies, "Economic Fluctuations and Growth," *Econometrica*, Vol. 25, 1957, pp. 1–52.

[5] R. M. Solow, "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics*, Vol. 70, 1956, pp. 65–94; J. Tobin, "A Dynamic Aggregative Model," *Journal of Political Economy*, Vol. 63, 1955, pp. 103–15.

[6] N. Kaldor, "A Model of Economic Growth," Economic Journal, Vol. 67, 1957, pp. 591–624; reprinted in *Essays in Economic Stability and Growth* (Duckworth, 1960); reference should also be made to: "Capital Accumulation and Economic Growth" to appear in the forthcoming proceedings of the International Economic Association's Corfu conference on capital theory, held in September 1958.

[7] A helpful review and exposition of dynamic theory is: W. Baumol, *Economic Dynamics*, 2nd edition (London: Macmillan, 1959).

[8] See especially H. Leibenstein, *Economic Backwardness and Economic Growth* (New York: Wiley, 1957).

[9] H. Leibenstein, *A Theory of Economic-Demographic Development* (Princeton: Princeton University Press, 1954).

development (for backward economies) are so great that one might be tempted to conclude that there is little in common between them. In the theory of development emphasis is laid on the balance between capital accumulation and the growth of population, each adjusting to the other. In the theory of growth the balance between investment and saving is all-important and the growth of population is treated as constant or shunted aside as a qualification to the main argument.[1] However great the differences between theories of growth and development appear to be, it is hard to escape the conclusion that each of the theories is true, sometimes. No simple model seems to be true all of the time or even very often. In particular, limitation of the analysis to situations in which there is effectively one producing sector rules out much of what is interesting about growth and development, at least if the empirical and institutional literature is any guide.[2] A few examples of "special situations" or "unsolved problems" created by concentration on a single output or a single production relation are: balance between industries in economic growth, imbalance between advanced and backward countries in international trade and the development of a dual economy, that is, of an economy with an advanced or modern sector and a backward sector as well.[3] These problems remain virtually untouched in the theoretical literature.[4] The purpose of this paper is to begin a frontal attack on the gap between theories of growth and theories of development by presenting a theory of development of a dual economy. The theory to be presented here is not intended to be yet another candidate for *the* universal theory of economic growth and development,[5] but only a theory which is applicable to a few well-defined and empirically significant historical situations. Whatever loss of generality is suffered in striving for something less than a

[1] For an exception to this rule see the interesting but brief theoretical treatment of population growth in Solow, *op. cit.*, pp. 90–1.

[2] See especially: W. A. Lewis, *The Theory of Economic Growth* (London: Allen and Unwin, 1955); and Part II of G. M. Meier and R. E. Baldwin, *Economic Development* (New York: Wiley, 1957); for a survey of the historical and institutional literature on development. For references to a dual economy see footnote 3, below.

[3] The source of the notion of a dual economy is: J. H. Boeke, *Economics and Economic Policy of Dual Societies* (Haarlem: Tjeenk Willnik, 1953) (earlier edition in two vols., 1942, 1946), which deal with the case of Indonesia; following Boeke's orientation is the important study by R. Firth, *Malay Fisherman* (London: Paul, Trench, Trubner, 1946), which discusses the traditional sector of the Malayan economy. For a critical view of Boeke's thesis and his policy recommendations, see B. Higgins, "The 'Dualistic Theory' of Underdeveloped Areas," *Economic Development and Cultural Change*, Vol. 4, 1956, pp. 99–115. The notion of a "dual economy" has been employed by Chenery, Clark, Mandelbaum, Rosenstein-Rodan and Singer, among others.

[4] But see G. O. Gutman, "A Note on Economic Development with Subsistence Agriculture," *Oxford Economic Papers*, Vol. 9, 1957, pp. 323–9, with mathematical appendix by J. Black. Black uses the well-known two-country trade model of H. Johnson: "Increasing Productivity, Income-Price Trends and the Trade Balance," Economic Journal, Vol. 64, 1954, pp. 462–85; reprinted in *International Trade and Economic Growth* (London: Allen and Unwin, 1958), pp. 94–119.

[5] For recent assaults on the summit see Joan Robinson, *The Accumulation of Capital* (London: Macmillan, 1958); D. G. Champernowne, "Capital Accumulation and Full Employment," Economic Journal, Vol. 68, 1958, pp. 218–44; and the references of footnotes 4–6 on p. 309.

single theory of growth must be balanced against the gain in specific implications for those situations to which the theory of development of a dual economy does apply.[1]

Very briefly, the situation envisaged in the theory of a dual economy is this: The economic system may be divided into two sectors—the advanced or modern sector, which we will call, somewhat inaccurately, the manufacturing sector, and the backward or traditional sector, which may be suggestively denoted agriculture.[2] Productive activity in each sector may be characterised by a function relating output to each of the factors of production—land, labour and capital. The special character of the theory of development of a dual economy is a certain asymmetry in the productive relations. If the two production functions were essentially symmetric, that is, if each function included all three productive factors, the resulting model would be suited to the problems of industrial balance in an advanced economy or to dynamic problems in the theory of international trade.[3] In the theory of a dual economy the output of the traditional or agricultural sector is a function of land and labour alone; there is no capital accumulation, except where investment takes the form of land reclamation. For the purposes of the present analysis it seems best to assume that all potentially arable land is under cultivation, so that land is fixed in supply. Land does not appear as a factor of production in the manufacturing sector; the level of manufacturing output is a function of capital and labour alone. Agricultural activity is characterised by diminishing returns to scale. Although there are many ways to account for diminishing returns—*e.g.*, declining quality of the land as more and more is put under cultivation as in Ricardo's extensive margin [4]—the initial assumption that land is fixed in supply (and of one uniform quality, arable) implies that the diminishing returns encountered in agricultural production arise at the intensive margin of the Ricardian scheme. The interpretation of diminishing returns and increasing returns as the effect of a fixed factor has been stressed by Kaldor.[5] In manufacturing, expansion of productive activity proceeds with constant returns to scale. This appears to be a reasonable assumption, at least on the basis of evidence from the manufacturing industries of advanced economies.[6] A second feature of the production functions for agriculture and

[1] The situation envisaged is that of Japan, as well as the areas of South-East Asia studied by Boeke and Firth. The idea of a dual economy evidently has considerably broader empirical relevance.

[2] In the primary-producing countries of South-East Asia the advanced sector is plantation agriculture, mining and extraction of petroleum. The traditional sector is peasant agriculture and fishing. In Japan the traditional sector includes agriculture, small manufacturing and most construction; the advanced sector should be identified with Japanese heavy industry.

[3] That is, to the problems treated by Johnson, *op. cit.*

[4] D. Ricardo, *Principles* (London: Dent, 1911 (first edition 1817)), p. 35.

[5] N. Kaldor, "The Equilibrium of the Firm," Economic Journal, Vol. 44, 1934, pp. 60–76.

[6] Reference may be made to the theory of the L-shaped cost curve: P. Wiles, *Price, Cost and Output* (Oxford: Blackwell, 1956), Chapter 12 and appendix, pp. 202–51; and J. S. Bain, *Barriers to New Competition* (Cambridge: Harvard, 1956), Chapter 3, pp. 53–113.

industry is that each function will shift over time so that a given bundle of factors will generate a higher level at one date than at an earlier date. The autonomous shifts in the production function correspond to technological changes. Although it is possible to devise purely economic explanations for some observed changes in technology,[1] we will assume that the changes take place at some more or less constant rate and that all changes are neutral.[2]

The assumption that technical changes are neutral is by now customary in the analysis of growth; whatever the theoretical importance of biased technical progress, it is hard to see how one may distinguish empirically between shifts of a production function, movements along it and shifts in the relative factor productivities, simultaneously.[3]

The characteristic feature of the theory of development of a dual economy is the asymmetry between production relations in the industrial and agricultural sectors. The remaining elements of the theory may be enumerated briefly: Population growth depends on the supply of food *per capita* and the force of mortality; the force of mortality is assumed given—it may be altered only by an alteration in medical technique. The birth rate depends on the supply of food *per capita*; however, it may attain a physiological maximum, or a maximum given by a particular social situation and by the state of medical knowledge, provided that the supply of food is sufficient. If the food supply is more than sufficient there exists an agricultural surplus, and labour may be freed from the land for employment in manufacturing. Labour is divided between the two sectors in a straightforward manner: if there is no agricultural surplus, all labour remains on the land; if an agricultural surplus can be generated, a labour force available for employment in manufacturing grows at a rate which is equal to the rate of growth of the agricultural surplus. Of course, no manufacturing production is possible without some initial capital stock, however small the initial bundle may be. Once the initial injection of capital is made, capital formation proceeds at a pace determined by the growth of the manufacturing labour force and by the terms of trade between the two sectors. It would not be correct to assume, as one might more readily assume in an advanced economy, that the real wage-rate is the same in the two sectors. In the first place only labourers in the advanced urbanised sector can be assumed to respond to wage differentials between employment opportunities in agriculture and industry. Since the course of development will result, with few lapses, in a steady

[1] See, for example, the interesting work of Zvi Griliches: "Hybrid Corn: An Exploration in the Economics of Technological Change," *Econometrica*, Vol. 25, 1957, pp. 501–22.

[2] A technological change is "neutral" provided that for a given bundle of factors the marginal rate of substitution between factors with output held constant is the same before and after the change.

[3] There is a considerable literature on this problem, mainly unpublished. The key reference is R. M. Solow, "Technical Change and the Aggregate Production Function," *Review of Economics and Statistics*, Vol. 39, 1957, pp. 312–20, where shifts of a production function and movements along it are separately identified. It is an open question whether it is possible to test the assumption of neutrality of technical change which underlies Solow's work.

migration of labour from the backward agricultural sector to the modern sector, some differential between wages in agriculture and wages in manufacturing may be expected to persist. We will assume that this differential is proportional to the manufacturing wage-rate and is stable in the long run. This differential determines the terms of trade between manufacturing and agricultural sectors, and thereby the rate of investment in the modern or advanced sector. Under this interpretation of the model it must be assumed either that the economy is closed to trade or that trade is in balance, not only overall but also in the goods of each sector. Such a balance could occur, for example, whenever there are no imports or exports of food and trade is in balance. Then manufactured goods would be traded for manufactured goods and the production function of the advanced sector would consist of a relationship between factors employed in manufacturing and domestic utilisation of manufactured goods, including imports and excluding exports. The assumption that the economy is essentially closed to trade follows the practice of most recent contributions to the theory of growth and development.[1] An alternative interpretation of the model is that the terms of trade between agriculture and industry in domestic commerce are determined by the rate of substitution of manufactured goods for agricultural goods in international trade. Then the wage differential between agriculture and industry would be determined by the terms of trade. In what follows we confine the analysis to a closed economy or an economy in which trade is in balance for goods of both sectors.

2. To begin the analysis we consider an economic system in which no development of manufacturing activity has taken place; all productive activity is concentrated in the traditional or backward sector. Then, if P is the total population and Y is agricultural output with L the fixed quantity of land available to the society, a simple version of the production function in agriculture, characterised by constant returns with all factors variable is given by the Cobb–Douglas production function:[2]

$$Y = e^{\alpha t} L^{\beta} P^{1-\beta}$$

where $e^{\alpha t}$ represents the shift factor corresponding to technological progress. Changes in techniques are assumed to take place at a constant rate, α. The constant β represents the elasticity of output with respect to an increase in the supply of land; as is well known, it also corresponds to the share of landlords in the product of the traditional sector; if the supply of land is

[1] See the references in footnotes 4–6, p. 309.

[2] The basic reference to the work of Douglas is "Are There Laws of Production," *American Economic Review*, Vol. 38, 1948, pp. 1–42; many further references are listed there. The so-called Cobb–Douglas form was apparently introduced into the literature by Wicksell in his notable article "A Mathematical Analysis of Dr. Akerman's Problem," *Ekonomisk Tidskrift*, Vol. 25, 1923, pp. 157–80; translated into English by E. Classen, and reprinted as part of an appendix to Wicksell's *Lectures on Political Economy*, Vol. I (London: Routledge and Kegan Paul, 1934). For a recent discussion of "Akerman's problem" reference must be made to the contribution of R. M. Solow to the Corfu conference on capital theory.

fixed, as in the model described here, this share takes the form of rent, defined as the unimputed residual remaining after the share of labour in the product, $1 - \beta$, has been paid to the agricultural labour force. Since the supply of land is assumed fixed, it is possible to choose the origin for measuring the passage of time so that the production function may be rewritten in the simpler form:

$$Y = e^{\alpha t} P^{1-\beta}$$

Dividing both sides by the agricultural population, we have:

$$y = \frac{Y}{P} = e^{\alpha t} P^{-\beta}$$

where y is agricultural output per man. Differentiating with respect to time and dividing through by output per man, this production function takes the form:

$$\frac{\dot{y}}{y} = \alpha - \beta \frac{\dot{P}}{P}$$

where α is the rate of technical progress and β is defined as before. This equation characterises the agricultural production function completely for the analysis to follow.

The second characteristic feature of the agricultural system is described by the function which governs the growth of population. It is assumed that if there is literally no agricultural production the reproduction rate falls to zero and the force of mortality is constant at the level δ. Secondly, it is assumed that the rate of gross reproduction is an increasing function of agricultural output per head up to some physiological maximum, say $\epsilon + \delta$. It is simplest to assume that the rate of increase in the gross reproduction rate is constant as *per capita* income increases, so that the population theory may be written in the form:

$$\frac{\dot{P}}{P} = \min \begin{cases} \gamma y - \delta \\ \epsilon \end{cases}$$

where γ is the rate of increase in the gross reproduction rate with respect to an increase in the output of food per man. The net reproduction rate $\dot{P}/P$ is the gross reproduction rate less the force of mortality, where the gross reproduction rate is the minimum of the two rates determined by the physiologically maximum rate of reproduction and the rate determined by the output of food per head.

For the first phase of development, in which reproduction is below its physical maximum, the population function and the production function may be combined to give a single differential equation in output per head alone:

$$\frac{\dot{y}}{y} = \alpha - \beta(\gamma y - \delta) = \alpha + \beta\delta - \beta\gamma y$$

Now, multiplying by y, we obtain the fundamental differential equation for the theory of development of the agricultural sector:

$$\dot{y} = (\alpha + \beta\delta)y - \beta\gamma y^2$$

To characterise the possible modes of development for an economic system which satisfies the conditions defining the production function and the theory of population growth, we will analyse the solutions of this equation. It should be noted first that there are two stationary solutions of the equation, that is, values of *per capita* income, which once established will maintain themselves. All such stationary solutions may be found by setting the rate of change in *per capita* income to zero, as follows:

$$(\alpha + \beta\delta)y - \beta\gamma y^2 = 0$$

This equation has two roots, $y_1 = 0$, and $y_2 = (\alpha + \beta\delta)/\beta\gamma$, which is necessarily positive. If the level of agricultural output reaches zero the rate of population growth falls to the negative rate given by the force of mortality, $-\delta$, and population dies off exponentially. No further attention need be devoted to this case; we confine further analysis to the stationary solution y_2. We have already characterised y_2 as a situation in which *per capita* output of food remains constant. The rate of population growth must, however, be positive. This may be seen by inserting the given value for y_2 into the equation for determining the rate of growth of population:

$$\frac{\dot{P}}{P} = \gamma[(\alpha + \beta\delta)/\beta\gamma] - \delta = \frac{\alpha}{\beta} > 0$$

so that population and the food supply grow at the same positive rate with no progress, that is, no increase in the output of food *per capita*. The situation in which output per head remains stagnant and population growth is positive is precisely that envisioned in Leibenstein's low-level equilibrium trap.[1] Although there are important differences between the model described here and that of Leibenstein, the existence of a kind of " trap " level of income suggests the problem: Under what conditions is the low-level equilibrium trap stable? In formal terms: Under what conditions is y_2 a stable solution of the fundamental differential equation? The answer is simple: If a low-level equilibrium trap would be stable, if it existed, then it must exist. In this case existence of stationary equilibrium and its stability are equivalent.

To complete the analysis of a pure traditional or agricultural system, let us denote by y^+ the minimum level of income at which $\dot{P}/P$ attains its physiological maximum. Then, using the model for population growth, we may solve for y^+ as follows:

$$\frac{\dot{P}}{P} = \gamma y^+ - \delta = \epsilon$$

[1] Leibenstein, *Economic Backwardness and Economic Growth*, Chapter 3, and the references listed there, p. 15.

Hence:

$$y^+ = (\epsilon + \delta)/\gamma$$

is the value of production of food per head at which population growth attains its maximum rate. The two cases into which solutions to the fundamental differential equation may be divided are distinguished as follows: If the critical level of income, y^+, is below y_2, the stationary level assuming that population growth has not attained its maximum, y_2 will not be attained, since it would require a rate of growth in population higher than the physiological maximum. In the event that y_2 exceeds y^+ the growth path will be given instead by the expression:

$$\frac{\dot{y}}{y} = \alpha - \beta\epsilon$$

Multiplying both sides by y we have:

$$\dot{y} = (\alpha - \beta\epsilon)y$$

which has the general solution:

$$y(t) = e^{(\alpha - \beta\epsilon)t}\, y(0)$$

where the rate of growth in *per capita* income, $\alpha - \beta\epsilon > 0$, will be attained from any positive initial level of output. Note that if this rate of growth is positive, $y_2 > y^+$ and no stationary level of equilibrium (except $y_1 = 0$) exists. The second case is that in which $y_2 < y^+$. In this case the stationary level y_2 exists and is stable in the large, that is y_2 will be approached for any positive initial level of agricultural output. If the initial level of output is sufficiently high that population growth attains its maximum the rate of growth in output per head, $\alpha - \beta\epsilon$, is negative and output declines at this rate to the level y^+. From this point the original fundamental differential equation describes the further decline of *per capita* production of food to its equilibrium level, y_2. The obverse situation is that in which y_2 does not exist, but *per capita* income is initially below the rate at which population growth attains its maximum. In this case the original fundamental differential equation describes the movement of *per capita* output to the level y^+, at which point population growth attains its maximum rate. After y^+ is attained, the growth of *per capita* output is described as taking place at the constant positive rate, $\alpha - \beta\epsilon$. The intermediate case in which $y^+ = y_2$ and $\alpha - \beta\epsilon = 0$ seems unlikely. But the resulting movements of the economy would be characterised by movements toward y_2 for any initial output level below $y_2 = y^+$. At any higher level the output of agricultural goods is in equilibrium; thus y_2 is stable from below and neutrally stable from above. All solutions $y > y_2$ are neutrally stable equilibrium values for the system, both from above and from below.

So far as the implication of the foregoing analysis for policy is concerned:

Any change in social policy corresponds to an alteration in the parameters of the system. If a society finds itself in a low-level equilibrium trap and the parameter β, representing diminishing returns to additions in the agricultural labour force, remains constant, only two parameters remain to be altered by social policy, namely, α, the rate of technical progress, and ϵ, the maximum net rate of reproduction. If the rate of technical progress can be increased (without the creation of a manufacturing sector) the sign of the expression $\alpha - \beta\epsilon$ may be changed from negative, the trap situation, to positive, in which case there is a steady increase in the output of food *per capita*. An alternative avenue for social policy would be a change in the rate of reproduction. Any improvement in medical technique would be reflected in a reduced force of mortality, so that δ, the previous mortality rate, would be reduced. For the same level of the gross reproduction rate, $\delta + \epsilon$, population would increase at a rate which was more rapid than before; that is, the net rate of reproduction, ϵ, would rise. Thus an improvement in medical technique with no other alterations in the parameters of the model would lead to a decrease in the test criterion, $\alpha - \beta\epsilon$, leading to retardation of the rate of growth. If this criterion is already negative, inspection of the expression for the stationary solution, y_2, reveals that the new stationary level of food output *per capita* is lower than before, so that improvements in medical technique with no other changes lead to immiseration of the surviving members of the population. On the other hand, institutional changes, leading to a restriction of the gross reproduction rate below its physiological maximum, will result in no rise in the stationary level of income; however, they may reduce the critical level of income, y^*, to a level at which it falls below the stationary level, y_2. In this event the test criterion changes from negative to positive and the system enters a phase of steady progress in the level of food output *per capita*. It may be helpful to contrast this model of economic development of a backward economy with the familiar low-level equilibrium trap model of Leibenstein. The only resemblance between the two models is that it is possible to have constant *per capita* output with a growing population. However, in the theory just presented there is at most one equilibrium level of output per head corresponding to each set of parameter values, while in Leibenstein's analysis there are two equilibrium solutions at which *per capita* income is constant, one stable in the small and the other unstable.[1] The implications for social policy are correspondingly different. To escape the low-level equilibrium trap of the present model, changes in the rate of introduction of new techniques or measures of birth control are prescribed; in Leibenstein's analysis the parameters of the model are regarded as essentially fixed and progress is possible only by a massive infusion of capital into the system. The role played by capital accumulation in the development of the agricultural sector

[1] Leibenstein, *op. cit.*

will be discussed in more detail below, after the development of the advanced sector has been described.

3. In this section a rigorous analysis of the fundamental differential equation for a backward economy is presented. Readers who are willing to take the mathematics for granted should go on to the next section. The preceding analysis of the fundamental differential equation revealed that there are essentially two modes of development for an economy which is purely traditional or wholly agricultural—either steady growth in output per man or equilibrium at some level of output per man which remains constant. Any given situation will be described by one of these two cases, depending on the net rate of reproduction, the elasticity of output with respect to increases in the labour supply and the rate of technological progress. In this section we present a detailed proof of the stability of the stationary solution $y_2 = (\alpha + \beta\delta)/\beta\gamma$ where such a solution exists, and the equivalence of the existence of such an equilibrium to the condition $\alpha - \beta\epsilon < 0$. We will also show that if $\alpha - \beta\epsilon > 0$ the long-run steady growth solution will be attained from any positive initial output levels. We begin by solving the fundamental differential equation:

$$\dot{y} = (\alpha + \beta\delta)y - \beta\gamma y^2$$

First, changing variables, let $y = y_2 - 1/u$ define the new variable, u; then the fundamental equation is written:

$$\frac{\dot{u}}{u^2} = (\alpha + \beta\delta)(y_2 - 1/u) - \beta\gamma(y_2 - 1/u)^2$$

Eliminating y_2 and multiplying by u^2 we have:

$$\dot{u} = (\alpha + \beta\delta)u - \beta\gamma$$

which has the solution:

$$u(t) = e^{(\alpha+\beta\delta)t}\left[\frac{1}{y_2 - y(0)} - \frac{\beta\gamma}{\alpha + \beta\delta}\right] + \frac{\beta\gamma}{\alpha + \beta\delta}$$

Substituting this expression into the fundamental differential equation, we obtain:

$$y(t) = y_2 + \frac{1}{e^{(\alpha+\beta\delta)t}\left[\frac{\beta\gamma}{\alpha + \beta\delta} + \frac{1}{y(0) - y_2}\right] - \frac{\beta\gamma}{\alpha + \beta\delta}}$$

which is the general solution for $y(t) < y^+$ and for $y(0) \neq y_2$.[1]

Case I. Suppose $y_2 < y^+$. Then $0 < (\alpha + \beta\delta)/\beta\gamma < (\epsilon + \delta)/\gamma$, since y_2 is always positive. But since γ is positive this reduces to:

$$\frac{\alpha}{\beta} + \delta < \epsilon + \delta$$

[1] This solution has the form of a "logistic" curve, familiar from many biological and economic applications.

Hence:

$$(\alpha - \beta\epsilon) < 0$$

which is necessary and sufficient for the steady growth path of output corresponding to $y > y^+$ to be characterised by a negative rate of growth. If $y(0) > y^+$ income declines to y^+. If $y_2 < y(0) \leqq y^+$ the general solution reveals that $y(t) - y_2$ diminishes to zero. If $0 < y(0) < y_2$, $y(t) - y_2$ increases to zero. Hence, for any positive initial level of output whatever, y_2 is a stable equilibrium solution. If $y(0) = y_2$, $y(t) = y_2$, since y_2 is an equilibrium of the fundamental differential equation.

Case II. Suppose $y_2 > y^+$. Then $\alpha - \beta\epsilon > 0$ by analogous reasoning and if $y(0) > y^+$ the system grows at the long-run equilibrium rate. If $0 < y(0) < y^+ < y_2$ the general solution has the form:

$$y(t) = y_2 + \frac{1}{e^{(\alpha+\beta)t}\left[\frac{1}{y_2} + \frac{1}{y(0) - y_2}\right] - \frac{1}{y_2}}$$

where $y(0) - y_2$, the initial value of the fraction on the right-hand side, is negative. Since $1/y_2 < 1/(y_2 - y(0)) < 0$, the fraction remains negative and approaches zero from below. But $y(t) = y^+ < y_2$ for t sufficiently large, since $y(t)$ approaches y_2 from below. Hence the equilibrium growth path is stable.

Case III. $y_2 = y^+$. If $0 < y(0) < y^+$, $y(0)$ approaches $y_2 = y^+$ from below. If $y(0) \geqq y_2$, $y(t) = y(0)$ for all t, since $\alpha - \beta\epsilon = 0$ by reasoning analogous to the previous two cases.

Note that the fundamental condition $y^+ \gtreqless y_2$, which determines whether or not a stationary equilibrium exists, is equivalent to the condition $\alpha - \beta\epsilon \gtreqless 0$, which determines whether or not such an equilibrium is stable, if it exists. The theoretical analysis which applies to a given case is determined by the three parameters α, β and ϵ, the rate of technical progress, the elasticity of output with respect to land (unity less the elasticity of output with respect to labour) and the net rate of reproduction.

4. In previous sections we presented an analysis of the development of a backward or purely traditional economic system. Depending on the conditions of production and the net reproduction rate, the system is characterised either by a low-level equilibrium, in which output per head is constant and population is growing at less than its physiologically maximum rate, or by a steady growth equilibrium, in which output per head is rising and population is growing at its physiologically maximum rate. Where output per head is constantly rising, an agricultural surplus is generated. Using the notation of the previous discussion, the agricultural surplus, per member of the agricultural labour force, is defined by:

$$y - y^+ = s$$

where s is the agricultural surplus. From the point of view of economic-

demographic development, y^+ is the level of output of food necessary to bring about the maximum rate of increase in population. If agricultural output exceeds this rate, part of the labour force may be freed from the land to produce industrial goods with no diminution in the rate of growth of the total labour force. Let us denote the agricultural population by A and the manufacturing population by M; then the total population is the sum of these two quantities:

$$P = A + M$$

The theory of population growth for a dual economy is essentially the same as that for a backward economy: The net rate of reproduction is the minimum of the physiologically maximum rate and the gross reproduction rate which corresponds to the output of food *per capita* for the total population, less the force of mortality. The function describing the growth of population may be written:

$$\frac{\dot{P}}{P} = \min \begin{cases} * \\ \gamma y \dfrac{A}{P} - \delta \end{cases}$$

Where $A = P$, the whole labour force is engaged in agricultural production, and the model of population growth reduces to that discussed previously.

In a dual economy labour may be freed from the land at a rate which is just sufficient to absorb the agricultural surplus. Of course, if the growth of manufacturing is not sufficiently rapid some of the excess labour force will remain on the land and part or all of the surplus may be consumed in the form of increased leisure for agricultural workers; this condition will eventuate in the virtual destruction of manufacturing activity or in some arrangement whereby manufactured goods are exported and food is imported. The latter situation is ruled out by our assumption of balance in trade in both classes of commodities. The balance between the expansion of the manufacturing labour force and the production of food is simply described: Total agricultural output is simply output per man employed in agriculture multiplied by the agricultural population. Total food consumption is y^+, multiplied by total population, so that the proportion of the total labour force employed in agriculture is the ratio of the subsistence level of agricultural production to the actual agricultural output per man in the agricultural population:

$$\frac{y^+}{y} = \frac{A}{P}$$

This relationship holds only when an agricultural surplus exists; that is, when there is a positive agricultural surplus rather than a shortage of food, and $y > y^+$. Hence, the relationship governing the distribution of labour between agriculture and industry may be represented by:

$$\frac{A}{P} = \min \begin{cases} 1 \\ y^+/y \end{cases}$$

To complete the model the conditions of production in manufacturing and of capital accumulation in the manufacturing sector must be described. If M is the manufacturing labour force and K is capital stock, then the level of manufacturing output is a function of the quantities of each of these factors employed; but since technical progress in manufacturing may be expected to be quite rapid, the output of manufactured goods for a given bundle of the two factors may be expected to depend not only on the amounts of each of the two factors employed but also on the time at which production takes place. The production function for manufacturing may be written in the form:

$$X = F(K, M, t)$$

where X is manufacturing output. For any given time, it will be assumed that the production function exhibits constant returns to scale; this assumption is equivalent to the assumption that manufacturing output is exhausted by factor payments to labour and to the owners of capital. If, further, the relative share of labour in manufacturing output is constant and all technical change is neutral, the production function may be represented in the Cobb–Douglas form:

$$X = A(t)M^{1-\sigma}K^{\sigma}$$

where $1 - \sigma$ is the relative share of labour and $A(t)$ is some function of time. If the rate of growth is A is constant, say:

$$\frac{\dot{A}}{A} = \lambda$$

then we have:

$$\dot{A} = \lambda A$$

and solving this relation as a differential equation we have:

$$A(t) = e^{\lambda t}A(0)$$

so that the production function takes the form:

$$X = e^{\lambda t}A(0)M^{1-\sigma}K^{\sigma}$$

Dividing X and K by M, and representing output per man and capital per man by x and k, respectively; further, changing the units of X so that $A(0) = 1$, we have the final version of the production function:

$$x = e^{\lambda t}k^{\sigma}$$

Differentiating this function with respect to time and dividing through by output per man, this expression reduces to:

$$\frac{\dot{x}}{x} = \lambda + \sigma\frac{\dot{k}}{k}$$

which may be compared with Kaldor's technical progress function for a

single-sector model.[1] The production function described here implies the existence of a technical progress function which is linear.[2] Whatever the difficulties which exist in expressing output per man as a function of capital per man,[3] it is clear that no distinction can be made between such a production function and a *linear* technical progress function from the point of view of empirical observation. The interpretation of the underlying mechanism is, of course, vastly different in the two cases; but the effects of the two distinct mechanisms cannot be separately identified empirically.

The remaining problem for the theory is this: What determines the rate of capital accumulation? The first approach to this problem is through the fundamental *ex post* identity between the sum of investment and the consumption of manufactured goods, on the one hand, and manufacturing output, on the other. We assume with Kaldor that industrial workers do not save and that property owners do not consume, at least out of their property income.[4] Then, the consumption of manufactured goods, in both the manufacturing and the agricultural sector, is equal to the share of labour in the product of the manufacturing sector. The industrial wage-rate is determined by the usual marginal productivity condition:

$$\frac{\partial M}{\partial X} = (1 - \sigma)x = w$$

where x is output per man, $1 - \sigma$ is the relative share of labour in the total product and w is the industrial wage-rate. The condition that the industrial wage-rate is equal to the marginal product of labour is a necessary condition for the maximisation of profit. While it is not unreasonable to assume that profits are maximised in the advanced sector, there seems to be much less reason for making such an assumption for the agricultural sector. In fact, agricultural workers can be expected to respond to wage differentials between industry and agriculture only if industrial wages are greater than agriculture income, where agricultural income includes both wages and rent. Following the Weber–Fechner law of proportional effect, we can assume that the differential which is necessary to cause movement of agricultural labour into the industrialised sector is roughly proportional to the industrial wage-rate. Let $\mu < 1$ denote the ratio between agricultural

[1] Kaldor, "Capital Accumulation and Economic Growth," mimeographed manuscript, p. 42, equation (14).

[2] This was pointed out to me by F. H. Hahn.

[3] For a discussion of the difficulties of constructing a production function see Joan Robinson, "The Production Function and the Theory of Capital," *Review of Economic Studies*, Vol. 21, 1953–54, pp. 81–106; R. M. Solow, "The Production Function and the Theory of Capital," *ibid.*, Vol. 23, 1955–56, pp. 101–8; Joan Robinson, "Reply," *ibid.*, Vol. 23, 1955–56, p. 247; and recently Joan Robinson, "Some Problems of Definition and Measurement of Capital," *Oxford Economic Papers*, Vol. 11, 1959, pp. 157–66.

[4] N. Kaldor, "Alternative Theories of Distribution," *Review of Economic Studies*, Vol. 23, 1955–56, pp. 83–100; reprinted in *Essays on Value and Distribution* (London: Duckworth, 1960).

income per man and the industrial *wage-rate* per man. Then the total wage bill for the economy is given by the expression:

$$wM + \mu wA = (1 - \sigma)X + qY$$

where wM is the industrial wage bill, μwA is total agricultural income (expressed in manufactured goods), $(1 - \sigma)X$ is total consumption of manufactured goods by workers in both sectors and qY is the value of agricultural output measured in manufactured goods. The variable q is the terms of trade between agriculture and industry. It is assumed that all of agricultural income, whether this income accrues in the form of rent or wages, is consumed. If part of agricultural income, say income from property, were available for investment inside or outside the agricultural sector, the balance relation given above could not hold. It is assumed that all agricultural incomes are consumed, so that investment in the manufacturing sector is financed entirely out of the incomes of property-holders in that sector. The assumption that landholders do not accumulate capital accords with the classical theories of land-rent, especially the theory of Smith and the physiocrats.[1] If agricultural activity is fully rationalised it would be necessary to replace the theory just described by one which is more neo-classical: Agricultural incomes could be divided into property incomes; the agricultural wage-rates (and hence the terms of trade) would be determined by the condition that real wages be equal in the two sectors in the long-run. It is assumed through the analysis that follows that agriculture is traditional in its organisation and that the classical model applies.

Once the share of labour in manufacturing output is distributed to workers in the form of food and consumption goods, and agricultural workers have received the proportion of manufacturing output which must be traded for food, the remainder of manufacturing output is available for capital accumulation, or more properly, for investment. Capital accumulation is defined as investment less depreciation, where depreciation (calculated by the declining-balance method) is a constant fraction of capital stock:

$$\dot{K} = I - \eta K$$

where η is the rate of depreciation, I is investment and $\dot{K}$ is net capital accumulation. Then, by definition, total industrial output is equal to consumption plus investment:

$$X = (1 - \sigma)X + I$$

which implies the following relation between output and capital stock:

$$X = (1 - \sigma)X + \dot{K} + \eta K$$

This relation closes the system and completes the formulation of a theory of development for a dual economy.

[1] See, for example, F. Quesnay, *Tableau Oeconomique* (London: British Economic Association, 1094 (first edition, 1758)).

5. To study the development of a dual economy for the case which is of greatest interest—that in which an agricultural surplus eventually emerges so that development of an advanced sector is possible—we must assume at the outset that $\alpha - \beta\epsilon > 0$, which is necessary and sufficient for the emergence of an agricultural surplus. If no such surplus comes into existence the economy remains in an undeveloped state, producing only food and other products of the traditional sector. The level of production stagnates, that is, remains constant with a rising population, while population increases at less than its maximum rate. The theory of a dual economy under these conditions reduces to the theory of a backward economic system, and nothing need be added to the analysis of the earlier sections. To characterise the development of an advanced sector we will begin by analysing the growth of the manufacturing labour force. This will be followed by a detailed consideration of capital accumulation and growth in the level of output. The analysis will be concluded by a discussion of wages, interest and the terms of trade between industry and agriculture. An industrial labour force comes into being when $y = y^+$, that is, when agricultural output attains the minimum level necessary for population to grow at its maximum rate. From this point forward, population grows at the rate ϵ, the maximum rate of net reproduction. This implies that:

$$P(t) = e^{\epsilon t} P(0)$$

where $t = 0$ is taken as that point of time at which $y = y^+$. From the fact that population is growing at a constant rate and that *per capita* consumption of food is stationary, it is easily seen that food output and population grow at the same rate:

$$\frac{Y}{P} = y^+$$

$$Y = Py^+ = P(0)e^{\epsilon t} y^+$$

Given the agricultural production function, the required rate of growth in the agricultural labour force necessary to maintain the growth of the agritural surplus may be calculated as follows:

$$Y = e^{\epsilon t} A^{1-\beta} = P(0)e^{\epsilon t} y^+$$

which implies:

$$A^{1-\beta} = P(0)y^+ e^{[\epsilon - \alpha]t}$$

which may be further simplified:

$$A = [P(0)y^+]^{\frac{1}{1-\beta}} e^{\left[\frac{\epsilon - \alpha}{1-\beta}\right]t}$$

But, recalling the fact that the origin of time is taken as the point at which the maximum rate of population growth begins, we have the following

relation between $P(0)$, total population (entirely employed in agriculture) and y^+, the critical level of agricultural output:

$$y^+ = P(0)^{-\beta}$$

substituting this expression for y^+ into the formulas given above, we obtain the following equivalent expressions for the agricultural labour force:

$$A = P(0)e^{\left[\frac{\epsilon-\alpha}{1-\beta}\right]t} = A(0)e^{\left[\frac{\epsilon-\alpha}{1-\beta}\right]t}$$

where $P(0) = A(0)$. It is easily seen that agricultural population may grow, decline or remain constant, depending solely on the relative magnitude of the two parameters ϵ, the maximum rate of population growth, and α, the rate of technological progress in the agricultural sector.

The manufacturing labour force (or population; no distinction between the two concepts is needed here) is total population less the agricultural population. Hence the growth of the manufacturing labour force is governed by the following expression:

$$M = P(0)\left[e^{\epsilon t} - e^{\left(\frac{\epsilon-\alpha}{1-\beta}\right)t}\right]$$

which is zero at time $t = 0$ and grows at a rate which is always more rapid than the rate of population growth. This is an immediate consequence of the condition equivalent to the existence of a positive agricultural surplus, namely:

$$\alpha - \beta\epsilon > 0$$

which implies:

$$\epsilon - \alpha < \epsilon(1 - \beta)$$

so that:

$$\epsilon > \frac{\epsilon - \alpha}{1 - \beta}$$

so that population is growing more rapidly than the agricultural labour force, hence the manufacturing labour force is growing more rapidly than population, since the rate of growth of population is simply the weighted average of the rates of growth of each of its two components. A second consequence which may be derived from the expression for the size of the manufacturing labour force is that the rate of growth is always declining and approaches, as a limit, the rate of growth of population, ϵ. This result may be deduced from the relative stability of the component $P(0)e^{\epsilon t}$ in the solution for M, the manufacturing labour force.

To study capital accumulation, it is necessary to analyse the relationship between growth of the industrial labour force, investment and output. In addition to the expression for the size of the manufacturing labour force:

$$M = P(0)\left[e^{\epsilon t} - e^{\left(\frac{\epsilon-\alpha}{1-\beta}\right)t}\right]$$

the fundamental relations include the production function:

$$X = e^{\lambda t} K^{\sigma} M^{1-\sigma}$$

and the identity in industrial output:

$$X = (1 - \sigma)X + \dot{K} + \eta K$$

which may be simplified as follows:

$$\sigma X = \dot{K} + \eta K$$

which is, in familiar terms, saving equals investment. Investment is made up of two components—net capital accumulation, $\dot{K}$, and replacement investment, ηK. Using the production function to eliminate X, the level of output in the manufacturing sector, we have:

$$\dot{K} + \eta K = \sigma e^{\lambda t} K^{\sigma} M^{1-\sigma}$$

Using the expression for the size of the manufacturing labour force, we have:

$$\dot{K} = -\eta K + \sigma K^{\sigma} P(0)^{1-\sigma} e^{\lambda t}\left[e^{\alpha t} - e^{\left(\frac{\alpha - a}{1-\beta}\right)t}\right]$$

which is the fundamental differential equation for the development of a dual economy. To study capital accumulation it is necessary to solve the fundamental differential equation and to characterise its solutions. In the case of a purely traditional economy it was possible to obtain a solution of the fundamental equation in closed form so that a complete characterisation of the modes of development of the system could be obtained. It is apparently impossible to solve the equation for a dual economy in the same way, so that only long-run tendencies of the system can be characterised.

The first thing to be noted is that there is no stationary situation for any economy in which capital accumulation is possible, that is, for which there is a positive and growing agricultural surplus. Once the economy has begun to grow it must continue to do so. The actual pattern of growth is determined by two fixed initial conditions: First, the size of the total population at the time at which sustained growth begins; secondly, the size of initial capital stock. Of these parameters, only the influence of the initial size of population has any effect on the long-run growth of the economy. The influence of initial capital stock dies out quickly; the greater the rate of depreciation η and the greater the relative share of labour $(1 - \sigma)$, the more rapidly the effects of the initial capital endowment disappear. Secondly, there is no critical level of initial capital endowment below which no sustained growth is possible. Even the smallest initial stock gives rise to sustained growth; that is, the combination of a positive and growing agricultural surplus and a small positive initial capital endowment must give rise to the well-known and much-discussed take-off into sustained capital accumulation and increase in output. If sustained growth can be achieved, the long-run

characteristics of capital accumulation, increases in the level of output and growth of population eventually assume easily recognisable form. For long-run equilibrium growth, capital and output grow at the same rate, even in the presence of neutral technological change. If there is no technical progress in manufacturing, capital, output and population all grow at the maximum rate of growth of population, ϵ. If technical progress takes place, population grows at its maximum rate, ϵ; capital and output grow at a more rapid rate, namely $\lambda/(1-\sigma)+\epsilon$, where λ is the rate of technical progress and $(1-\sigma)$ is the share of labour. Growth in the level of manufacturing output is more rapid the greater the rate of growth of the labour force and the more rapid the pace of technological change; growth is less rapid the greater the share of labour in current output or more rapid the greater the saving ratio. The rate $\lambda/(1-\sigma)+\epsilon$ is a kind of natural rate of growth, Harrod's G_n. The fact that in the long-run the accumulation of capital and the growth of output adjust themselves to the natural rate when substitution in production is permitted is due to Solow,[1] whose analysis of the growth of an advanced economy provides an approximation the model of development for a dual economy which improves as a larger and larger proportion of the total activity of the system shifts from the traditional to the advanced sector. Since capital and output grow at the same rate in long-run equilibrium, the capital–output ratio approaches a fixed value. Whether or not the accelerator is fixed in the short-run, long-run equilibrium growth will be characterised by a constant ratio of capital to output, even in the presence of technological change, factor substitution and an underdeveloped sector of the economy. For an advanced economy characterised by a pattern of development like that of the dual economy we have analysed, the familiar Harrod–Domar growth model is a perfectly valid theory of growth in long-run equilibrium.[2] It must be noted that this result is strictly correct *only* in long-run equilibrium; the validity of the short-run aspect of Harrod's model, with its knife-edge instability under the impact of short-run disequilibrium movements, cannot be assessed here.

We have been able to discuss only the features of the theory of development of a dual economy which characterise long-run equilibrium. One further aspect of the theory which should be noted is the absence of a critical "minimum effort" necessary for take-off into sustained growth. Whatever the initial capital endowment of the advanced sector, sustained growth must eventuate. Secondly, no matter how small the initial endowment, the beginning of growth of manufacturing output is invariably accompanied by a "big push" of activity associated with an extraordinarily high rate of growth of output. But for a dual economy this high initial rate of growth

[1] R. M. Solow, "A Contribution to the Theory of Economic Growth." The result that capital and output grow at the same rate with neutral technological change does not accord with the analysis of Solow, *op. cit.*, p. 86. In correspondence he points out that a minor arithmetical slip in his argument is responsible for the discrepancy.

[2] For the basic references see footnote 3, p. 310 above.

may be viewed as essentially a statistical artifact. Using the production function for the advanced sector, it is possible to derive the relation:

$$\frac{\dot{X}}{X} = \lambda + (1 - \sigma)\frac{\dot{M}}{M} + \sigma\frac{\dot{K}}{K}$$

so that the rate of growth of output in the industrial sector is the rate of technological progress plus a weighted average of the rates of growth of the manufacturing labour force and the rate of growth of capital stock. Since capital stock always grows at some positive rate and the growth of the manufacturing labour force begins at an extremely high rate and declines gradually to the rate of growth of population, the initial rate of growth of manufacturing output must be extremely high, declining gradually and approaching its equilibrium value. The existence of a statistically observable " big push " in manufacturing output is no evidence for the necessity of a massive infusion of capital from outside the system. There may be other reasons for which such an infusion might be desirable;[1] it is clearly unnecessary for development leading to sustained growth.

To complete the discussion we must consider the development of wages, interest and the terms of trade between the advanced and the underdeveloped agricultural sector. First, wages per man must be equal to the share of labour multiplied by output per man. Real wages in manufacturing must therefore rise at the rate $\lambda/(1 - \sigma)$ in long-run steady growth; this may be seen as follows:

$$\frac{\dot{w}}{w} = \frac{\dot{x}}{x} = \left[\frac{\dot{X}}{X} - \frac{\dot{M}}{M}\right] = \left[\frac{\lambda}{1 - \sigma} + \epsilon\right] - \epsilon = \frac{\lambda}{1 - \sigma}$$

since output per man grows at a rate given by the rate of growth of output less the rate of growth of the manufacturing labour force. If there is no technological progress in the advanced sector real wages eventually reach some constant level. If technical progress is possible, real wages rise more rapidly, the more rapid the rate of technological change and the higher the saving ratio. Another way to state the relationship of the growth of real wages and the savings ratio is this: The higher the share of labour in the product of any given period, the more slowly must real wages rise. Unlike wages, the real rate of interest attains a constant level whether or not there is technical progress. Provided that activity in the advanced sector is highly rationalised, that is, predominantly " capitalistic " in its mode of organisation, the rate of interest is determined by the usual marginal productivity condition:

$$\frac{\partial X}{\partial K} = \sigma\frac{X}{K} = r$$

[1] A persuasive case for capital-intensive investments is made by H. Leibenstein and W. Galenson, " Investment Criteria, Productivity and Economic Development," *Quarterly Journal of Economics*, Vol. 70, 1955, pp. 343–70; see also: H. Leibenstein, *Economic Backwardness and Economic Growth*, Chapter 15.

which is necessary for maximisation of profit in the advanced sector. But the ratio of capital to output is constant in long-run sustained growth; where C is the capital–output ratio of Harrod, this yields the familiar:

$$r = \frac{\sigma}{C}$$

where σ is the saving ratio. The rate of interest is equal to Harrod's warranted rate, which is essentially the gross rate of capital accumulation or I/K, in the notation of the last section. The rate of growth of output (and the rate of net capital accumulation) is less than the warranted rate by the amount of depreciation on capital stock. This implies that:

$$r = \frac{\sigma}{C}\left[\frac{\lambda}{1-\sigma} + \epsilon\right] + \eta = G_n + \eta$$

where G_n is Harrod's notation for the natural rate of growth. The rate of interest rises with an increase in the rate of technical progress, with an increase in the rate of population growth or in the rate of depreciation on capital, and with a rise in the saving ratio. Another way to state the relation between the rate of interest (the rate of gross capital accumulation) and the rate of depreciation on capital is this: Interest increases with a decline in the durability of capital equipment. Another way to derive the basic relationship between interest and the rate of growth on capital stock is to note that all property income is " interest " in the sense in which interest is used here, so that the total volume of interest payments is equal to gross investment:

$$rK = \dot{K} + \eta K$$

which implies:

$$r = \frac{\dot{K}}{K} + \eta$$
$$= G_n + \eta$$

as before. From these relationships it is possible to compute the long-run sustained growth capital–output ratio, Harrod's C. The capital–output ratio is given by:

$$C = \frac{\sigma(1-\sigma)}{\lambda + (1-\sigma)(\epsilon + \eta)}$$

which increases with the saving ratio and diminishes with the rate of growth of population, the rate of technical progress and the rate of depreciation on capital goods. Turning finally to the terms of trade between agriculture and industry, we have:

$$wM + \mu wA = (1-\sigma)X + qY$$

as the balance relation between industry and agriculture. This reduces to the simpler expression:

$$\mu wA = qY$$

This may be used to derive the expression:

$$\mu w P(0) e^{\left(\frac{\epsilon-\alpha}{1-\beta}\right)t} = q e^{\epsilon t} y^{*}$$

hence:

$$q = w \frac{\mu}{y^{*}} e^{\left[\left(\frac{\epsilon-\alpha}{1-\beta}\right)-\epsilon\right]t}$$

from which the following expression:

$$\frac{\dot{q}}{q} = \left[\frac{\epsilon-\alpha}{1-\beta} - \epsilon\right] + \frac{\dot{w}}{w}$$

is derived by differentiating both sides with respect to time and then by dividing through by q, where q is the terms of trade, that is, the price of agricultural goods in terms of manufactured goods. The first two terms of this expression are negative by the condition that $\alpha - \beta\epsilon > 0$, which is necessary and sufficient for the emergence of an agricultural surplus. The third term, the rate of growth of real wages, is positive and equal to $\lambda/(1-\sigma)$. If technical progress in the manufacturing sector declines to zero the terms of trade for the agricultural sector must deteriorate. The more rapid the rate of technical progress in manufacturing, the less rapidly the terms of trade for agriculture deteriorate; if technical progress is sufficiently rapid the terms of trade may even improve for agriculture. Not unexpectedly, precisely the opposite holds for changes in the terms of trade with respect to changes in the rate of technical progress in agriculture. The more rapid the rate of technical progress, the more rapidly the terms of trade deteriorate. A second consequence of the fundamental balance relation is that the more rapidly population increases, the less rapidly the terms of trade of agriculture deteriorate. Finally, the effects of diminishing returns in agriculture depend on the relative magnitude of technical progress in agriculture and the rate of growth of population. If $\epsilon > \alpha$ the terms of trade improve if returns diminish more rapidly than before; if $\epsilon = \alpha$ the terms of trade remain unaltered by a change in the rate at which returns to additions in the agricultural labour force diminish; finally, if $\epsilon < \alpha$ the terms of trade deteriorate if returns to scale in agriculture diminish more rapidly.

6. In this section a rigorous analysis of the fundamental differential equation of the theory of development of a dual economy is given. This analysis is necessary to provide a detailed derivation of the conclusions of the previous section; as in Section 3 above, readers who trust the mathematics should go on to the following section. The fundamental differential equation is given by:

$$\dot{K} = -\eta K + \sigma K^{\sigma} P(0)^{1-\sigma} e^{\lambda t} \left[e^{\epsilon t} - e^{\left(\frac{\epsilon-\alpha}{1-\beta}\right)t}\right]^{1-\sigma}$$

where K is the size of capital stock, P is the size of the total population, and the various parameters are derived from the expression for growth of the manufacturing labour force, the production function for the advanced sector

and the identity in manufacturing output and its allocation to consumption and investment. To solve this equation, we begin by transforming variables so that:

$$K = U^{\frac{1}{1-\sigma}}$$

hence,

$$\dot{K} = \frac{1}{1-\sigma} U^{\frac{\sigma}{1-\sigma}} \dot{U}$$

The fundamental equation may be rewritten in the form:

$$\begin{aligned}\dot{U} &= -(1-\sigma)\eta U + \sigma(1-\sigma)P(0)^{1-\sigma} e^{\lambda t}\left[e^{\eta t} - e^{\left(\frac{\lambda-\alpha}{1-\beta}\right)t}\right]^{1-\sigma} \\ &= -(1-\sigma)\eta U + q(t)\end{aligned}$$

which is linear in U and may be integrated as follows:

$$U(t) = e^{-(1-\sigma)\eta t} U(0) + e^{-(1-\sigma)\eta t} \int_0^t e^{(1-\sigma)\eta t_1} q(t_1)\, dt_1$$

Now, consider the integral:

$$\begin{aligned}&\int_0^t e^{(1-\sigma)\eta t_1} q(t_1)\, dt_1 \\ &= \sigma(1-\sigma)P(0)^{1-\sigma} \int_0^t e^{[(1-\sigma)(\alpha+\eta)+\lambda]t_1}\left[1 - e^{\frac{-(\alpha-\beta\alpha)}{1-\beta} t_1}\right]^{1-\sigma} dt_1 \\ &= \sigma(1-\sigma)P(0)^{1-\sigma} \int_0^t e^{pt_1}\left[1 - e^{-qt_1}\right]^r dt_1\end{aligned}$$

where p, q and r are defined as in the second line above and are used to simplify notation for the computations that follow. It is apparently impossible to evaluate this integral in closed form except for special cases (such as $r = 1$, which is ruled out for the problem at hand). It is necessary to expand $[1 - e^{-qt_1}]^r$ in Maclaurin series as follows:

$$\begin{aligned}\left[1 - e^{qt_1}\right]^r = 1 - re^{-qt_1} + \frac{r(r-1)}{2!} e^{-2qt_1} - \cdots \\ + (-1)^n \frac{r(r-1)\cdots(r-n+1)}{n!} e^{-nqt_1} + \cdots\end{aligned}$$

Hence, the integral is written:

$$\begin{aligned}\int_0^t \Big[e^{pt} - re^{(p-q)t_1} + \frac{r(r-1)}{2!} e^{(p-2q)t_1} - \cdots \\ + (-1)^n \frac{r(r-1)\cdots(r-n+1)}{n!} e^{(p-nq)t_1} + \cdots\Big]\end{aligned}$$

Integrating term by term we obtain:

$$\int_0^t e^{pt_1}\left[1 - e^{-qt_1}\right]^r dt_1$$

$$= \frac{1}{p}[e^{pt} - 1] - \frac{r}{p-q}[e^{(p-q)t} - 1] + \frac{r(r-1)}{2!(p-2q)}[e^{(p-2q)t} - 1] - \ldots$$

$$+ (-1)^n \frac{r(r-1)\ldots(r-n+1)}{n!(p-nq)}[e^{(p-nq)t} - 1] + \ldots$$

Hence:

$$U(t) = e^{-(1-\sigma)\eta t}\,U(0) + \frac{\sigma(1-\sigma)P(0)^{1-\sigma}}{(1-\sigma)(\epsilon+\eta)+\lambda}\,e^{[\lambda+\epsilon(1-\sigma)]t} + R(t)$$

where $R(t)$ is a remainder, defined as the sum of the appropriate infinite series. Each term of $R(t)$ grows at a rate which is strictly less that the rate $\lambda + \epsilon(1-\sigma)$, which is the "dominant" term in the expression for $U(t)$. If $p > q$, $R(t) \to 0$ as t increases without limit; otherwise $R(t)$ grows over time, diminishing relative to the dominant term. Noting that the dominant term, which grows at a positive rate, and the remainder depend only on the initial value of population, and further that $U(0) = K(0)^{1-\sigma}$, it is clear that the effects of the initial endowment of capital die out, absolutely, and relative to the dominant term. To compute the long-run equilibrium value of the rate of growth for capital stock we note first that:

$$\frac{\dot{U}}{U} \to [\lambda + \epsilon(1-\sigma)] \text{ as } t \to \infty$$

But also, using the expressions for U and $\dot{U}$ derived previously we have:

$$\frac{\dot{K}}{K} = \frac{1}{(1-\sigma)}\frac{U^{\frac{\sigma}{1-\sigma}}\dot{U}}{U^{\frac{1}{1-\sigma}}} = \frac{1}{(1-\sigma)}\frac{\dot{U}}{U}$$

so that:

$$\frac{\dot{K}}{K} \to \frac{\lambda}{(1-\sigma)} + \epsilon \text{ as } t \to \infty$$

Secondly, using the expression:

$$\frac{\dot{X}}{X} = \lambda + (1-\sigma)\frac{\dot{M}}{M} + \sigma\frac{\dot{K}}{K}$$

we have the result that:

$$\frac{\dot{X}}{X} \to \lambda + (1-\sigma)\epsilon + \sigma\left[\frac{\lambda}{(1-\sigma)} + \epsilon\right] = \frac{\lambda}{(1-\sigma)} + \epsilon \text{ as } t \to \infty \,^{1}$$

so that capital and output grow at the same rate in long-run equilibrium. To compute the long-run equilibrium capital–output ratio, we can compute the ratio of the dominant components in the expressions for each of the terms, capital and output.

[1] This expression may be compared with an essentially equivalent expression derived by N. Kaldor, "A Model of Economic Growth," *loc. cit.*, p. 615. Neo-classical, Kaldor and dual economy models of growth all tend, in the limit, to the equilibrium growth path described by the Harrod–Domar model.

First, we may utilise the production function to derive:

$$X(t) = e^{\lambda t} P(0)^{1-\sigma} \left[e^{\epsilon t} - e^{\left(\frac{\epsilon-\sigma}{1-\beta}\right)t} \right]^{1-\sigma} K(t)^{\sigma}$$

$$= e^{\lambda t} P(0)^{1-\sigma} \left[e^{\epsilon t} - e^{\left(\frac{\epsilon-\sigma}{1-\beta}\right)t} \right]^{1-\sigma} U(t)^{\frac{\sigma}{1-\sigma}}$$

and we also have:

$$K(t) = U(t)^{\frac{1}{1-\sigma}}$$

so that:

$$C(t) = \frac{K(t)}{X(t)} = \frac{U(t)}{e^{\lambda t} P(0)^{1-\sigma} \left[e^{\epsilon t} - e^{\left(\frac{\epsilon-\sigma}{1-\beta}\right)t} \right]^{1-\sigma}}$$

$$\to \frac{\sigma(1-\sigma)P(0)^{1-\sigma} e^{[\lambda \times \epsilon(1-\sigma)]t}}{(1-\sigma)(\epsilon+\eta)+\lambda} \Big/ P(0)^{1-\sigma} e^{[\lambda+\epsilon(1-\sigma)]t}$$

$$= \frac{\sigma(1-\sigma)}{(1-\sigma)(\epsilon+\eta)+\lambda} \text{ as } t \to \infty$$

This completes the analysis of the fundamental differential equation.

7. The development of a dual economy has been discussed under the assumption that if an agricultural surplus comes into existence it will persist. If such a surplus is already in existence, and a change in the parameters of the system, particularly in the net rate of reproduction, results in a diminution of the agricultural surplus, implying its eventual disappearance, the course of development of the economy is considerably different. Eventually manufacturing activity is brought to a halt, capital is allowed to depreciate without replacement and the situation previously described as a low-level equilibrium trap is approached as a limit. If a low-level equilibrium trap exists, it is stable for any initial level of agricultural and industrial output, and for any initial stock of capital. To trace the decline of the economy to its trap level of output, note first that from the point at which the agricultural surplus begins to diminish, the agricultural labour force grows at a rate which is more rapid than the rate of growth of population and the manufacturing force declines absolutely, eventually becoming zero at some finite time, which is easily computed. At the point at which all labour has returned to the land, manufacturing output drops to zero and capital is decumulated at the rate given by the rate of depreciation; in the limit it disappears entirely. From the point at which industrial output drops to zero, the theory of a traditional economic system governs the further decline of the system to its trap level. Population growth is reduced from its maximum rate. Food output *per capita* declines to a stationary level.

The critical condition, which marks the dividing line between economies caught in the low-level equilibrium trap and economies capable of sustained growth, is simply that for sustained growth an agricultural surplus must

come into existence and must persist.[1] Formally, the condition which is necessary and sufficient for sustained growth of output in both the manufacturing and agricultural sectors is $\alpha - \beta\epsilon > 0$, where α is the rate of technical progress, ϵ is the maximum rate of population growth and $1 - \beta$ is the elasticity of output in the agricultural sector with respect to an increase in the agricultural labour force. The characteristics of an economy which moves toward a low-level equilibrium trap are completely described by the theory of a traditional or backward economy. The characteristics of an economy which experiences steady growth depend not only on the existence of an agricultural surplus but also on technical conditions in the advanced sector. The more rapid the rate of technical change, the higher the saving ratio, and the more rapid the rate of growth of population, the more rapid is the pace of growth in the advanced sector. Eventually, the economy is dominated by the development of the advanced sector and becomes more and more like the advanced economic systems described by the familiar Harrod–Domar theory of economic growth.

Of course, the theory of a dual economy is far from the whole story concerning the growth of an advanced economic system. From the outset the possibility of capital accumulation in agriculture was ruled out. While this assumption holds remarkably well for Asian agriculture, including the highly productive agricultural sector of the Japanese economy, in the " newly settled " lands of the United States, Canada, Argentina, Australia and New Zealand agriculture has experienced rapid increases in labour productivity due to infusions of capital. We have already noted that there is no " minimum critical effort " of investment in dual economies in which substitution between capital and labour in manufacturing is possible, and there is no capital accumulation in agriculture; however, one of the critical parameters of the expression dividing economies into developing and stationary systems is the rate of technological progress in agriculture. If technical progress can be accelerated by the accumulation of capital in agriculture the balance between food shortage and agricultural surplus may be tipped in favour of surplus. It must be remarked that this possibility presumes not only the availability of resources for investment in agriculture but also drastic changes in the social organisation of the " traditional " or backward sector. The infusion of capital must be accompanied by the infusion of the spirit of capitalism;[2] the traditional way of life must be replaced by a way of life in which production in both agriculture and industry is fully rationalised.

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[1] This condition is given its due weight by Kaldor in his paper " Characteristics of Economic Development " read to the International Conference on Underdeveloped Areas in October 1954, now printed in *Essays on Economic Stability and Growth* (London: Duckworth, 1960), pp. 233–42. See especially the discussion of this problem on p. 240.

[2] The rationalisation of production in the traditional sector is, obviously, one of the great " costs " of economic advancement in underdeveloped areas. The view that the cost is too great to pay is not without its adherents; see especially the work of Boeke, cited in footnote 3, p. 310.

A NOTE ON STABILITY AND THE BEHAVIOUR ASSUMPTIONS OF HARROD-TYPE MODELS [1]

I. Introduction

In a recent article, Rose [2] has raised some fundamental questions about the instability implications of Harrod–Domar type aggregate models. Whereas most previous criticisms of the Harrod–Domar framework and conclusions had been on neo-classical grounds,[3] Rose battles the model on its own terms, and, at first glance, appears to come out the victor. But, given the assumptions of the model, instability does seem an intuitively reasonable result, and Harrod has made such instability a part of our economic common sense.

Two critical assumptions of the model are: (1) output is determined by conditions of demand alone. There is no supply equation. The world is Keynesian, not classical. And (2), micro-decision-makers make plans in terms of *rates of growth*. When the system is in equilibrium plans are unchanged and *rates of growth* stay constant. But when income is growing at a rate faster (slower) than the warranted rate, inventories are running down (accumulating) and capacity is pressed (slack), micro-decision-makers will adjust their plans to step up (step down) the *rate of growth* of investment.

But this will tend to make income grow at a still faster (slower) rate. In Harrod's world (as in Keynes') decisions which seem equilibrating to micro-decision-makers are in fact disequilibrating in the aggregate.

These are the verbal arguments that clothe the Harrod–Domar equations. The existence of substitution possibilities, interest and wage-rate flexibility, a restraining monetary system, and adjustment mechanisms working on *rates*, rather than *rates of growth*, will tend to lend stability to the system, and the equations showing how these factors work are also easily clothed in verbal economics. But Rose does not call on these arguments. He accepts the general ground rules of the simplest Harrod–Domar model, and then argues that, under a very slight revision in the assumptions, the economy is stable.

This is intuitively unreasonable. And when Rose's equations are clothed in words it is clear that he has not shown what he has intended to show at all. None the less, his analysis, correctly interpreted, is a significant contribution to an understanding of problems of instability in Harrod-type models, if not in the real world. In this paper I shall examine Rose's argument and reinterpret his findings. Then I shall show that, though Rose's contribution

[1] The author is very much indebted to R. E. Bellman and T. W. Mullikin for help with the mathematical appendix, and to D. V. Bear, J. Haldi, E. S. Phelps, S. G. Winter and C. Wolf, Jr., for many helpful comments. Any remaining errors rest on the author's shoulders.

[2] H. Rose, "The Possibility of Warranted Growth," Economic Journal, June 1959.

[3] For example, J. Tobin, "A Dynamic Aggregative Model," *Journal of Political Economy*, April 1955, and R. Solow, "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics*, February 1956. For an excellent defense of the model see R. Eisner, "On Growth Models and the Neo-Classical Resurgence," Economic Journal, December 1958.

has complicated the analysis of stability, the amended model is still very unstable. However, there is a chance that if perturbed from equilibrium the economy can return. Finally, the model will be examined in the context of business-cycle theory. It will be shown that, as described by the model, the economy will tend to " crawl along the ceiling " at the top of a boom before falling back into a recession.[1]

II. Equilibrium and the Warranted Rate of Growth

The formal structure of the Harrod–Domar model deals with equilibrium conditions. The authors ask: What must the time path of national income (and actual investment) be if both investors and savers are to be content with the policies they are pursuing? Implicit in this concept of equilibrium is that if these conditions hold, policies will be continued, and if these conditions do not hold, policies will be changed. The Harrod warranted rate of growth, G_w, describes the time path that income must take if, in the above sense, there is to be equilibrium. Harrod argues that if the actual rate of growth is greater than G_w entrepreneurs will be dissatisfied, and will adjust their policies in such a way as to cause an increase in the rate of growth; and if the actual rate of growth is smaller than G_w entrepreneurs will adjust their policies in a way such as to cause a decrease in the rate of growth. Thus the economy is inherently unstable. But let us hold off our disequilibrium analysis for a moment, and turn to Mr. Rose.

Now Mr. Rose thinks he is engaging in disequilibrium analysis. The major purpose of his article is to show that, with only a slight amendment to the Harrod assumptions, the economy is stable. In fact, he has not done this at all. What he has done is to shed new light on the warranted rate of growth. But Rose's warranted rate of growth, his equilibrium, is every bit as unstable as Harrod's.

Rose suggests the following equation for the *desired* rate of investment:

$$I = C\dot{Y} + KV \tag{1}$$

where C is the long run desired ratio of capital stock to output flow, $\dot{Y}$ is the time rate of change of income and output, V is the existing capital shortage—the extent to which the existing capital stock falls short of CY—and K is a constant between zero and one that indicates how rapidly investors desire to make up the existing capital shortage. Note that if $K = 0$, equation (1) reduces to the Harrod desired investment equation, $I = C\dot{Y}$. And if $K = 1$, then equation (1) states that entrepreneurs wish to invest a sufficient quantity to keep $V = 0$ at all times. Thus Rose, unlike Harrod, takes into explicit account the extent to which the existing capital stock exceeds or falls short of the desired stock.[2]

In Rose's world, as in Harrod's, there is no reason to assume that all

[1] R. C. O. Matthews, " A Note on Crawling Along the Ceiling," *Review of Economic Studies*, October 1959.

[2] This is not to say that Harrod does not deal with this problem in his verbal analysis.

desired investment results from pressure on capacity. Equation (1) can be modified to take into account other investment demand. But in Rose's world, as in Harrod's, the argument loses its sting if pressure on capacity, present or expected, is not a very important factor determining desired investment. And, to put to rest another misconception, the Harrod–Rose model carries no implication of a technologically fixed capital–output ratio, nor of single factor production. Indeed, for the model to be interesting it must be possible for the actual capital–output ratio to vary quite widely—to fall when demand rises and capital is worked more intensively, to rise when demand falls and capital is worked less intensively. What is important for Harrod and Rose is that entrepreneurs desire to keep the capital–output ratio reasonably constant over the long run. This implies either a certain stickiness about relative factor prices, or that entrepreneurs use rules of thumb and do not optimise very effectively over the short run.

There are at least two possible interpretations of what determines the actual level of investment and income in a Harrod world. Rose assumes that investors have the whip hand. If they plan to invest at a certain rate actual investment is at that rate. I will argue later that this assumption differs somewhat from Harrod's, but it does not really matter. For both Rose and Harrod, *actual* investment equals, by definition, actual saving. And savers (consumers) adjust instantly to the existing income so as to make actual saving (consumption) equal to desired saving (consumption). Thus $I = SY$, where S is the average propensity to save.

If actual investment is to equal desired investment, if investors are to be satisfied with their existing policies, the following equations must hold:

$$C\dot{Y} + KV = SY \tag{2}$$

or

$$\frac{\dot{Y}}{Y} = \frac{S}{C} - \frac{K}{C}\left(\frac{V}{Y}\right) \tag{3}$$

Rose thinks that if actual investment equals planned investment equations (2) and (3) always hold. I believe he is wrong, but let us follow this assumption to Rose's conclusion, for though the conclusion does not mean what Rose thinks it means, the correct interpretation is of considerable economic interest. The economic meaning of equations (2) and (3) is as follows. If there is capital shortage at the current *level* of income ($V > 0$), then, from a given amount of resources available for investment (SY) there is less surplus ($SY - KV$) available for accelerator induced investment ($C\dot{Y}$). Hence given SY, the larger is KV, the smaller must be $C\dot{Y}$ if desired and actual investment are to be equal. The reader may note that $\frac{KV}{C\dot{Y}}$ plays the same role here as autonomous investment does in Harrod's book.

Thus if equation (3) holds, then the rate of growth of income is less than $\frac{S}{C}$

when capital is short (V is greater than zero), and when there is surplus capital (V is negative), the rate of growth of income is greater than $\frac{S}{C}$. Let us start our system with an initial and arbitrary $\frac{V}{Y}$, and see what happens to V and to $\frac{\dot{Y}}{Y}$ over time.

If X is the existing capital stock V is defined as:

$$V = CY - X \tag{4}$$

Differentiating V with respect to time and noting that $\dot{X} = I = SY$:

$$\dot{V} = C\dot{Y} - SY \tag{5a}$$

or

$$\dot{V} = CY\left[\frac{\dot{Y}}{Y} - \frac{S}{C}\right] \tag{5b}$$

From equation (3) we know that $\frac{\dot{Y}}{Y} > \frac{S}{C}$ if V is negative, and $\frac{\dot{Y}}{Y} < \frac{S}{C}$ if V is positive. Therefore $\dot{V}$ and V must have opposite signs, and whatever V is initially, V will move toward and approach zero. From equation (3) we can see that whatever $\frac{\dot{Y}}{Y}$ is initially (which will be determined by the initial $\frac{V}{Y}$), it will move through time to equal $\left(\frac{S}{C}\right)$ in the limit.[1]

Rose interprets this result as a demonstration of stability. Whereas Harrod argues that if the economy is growing faster than $\frac{S}{C}$ there are forces at work to make it grow even faster; and if the economy is growing at a rate slower than $\frac{S}{C}$ there are forces at work to make it grow even slower; Rose has shown that, given his assumptions (that is, if equation (3) holds) if the economy is growing at a rate faster than $\frac{S}{C}$, it will slow down to equal $\frac{S}{C}$; and if the economy is growing slower than $\frac{S}{C}$ it will speed up. Rose thinks he has shown that the warranted rate of growth is stable. But he has not done this at all.

Consider equation (1), and ignore equations (2) and (3) for the moment. What will be the effect on desired investment of, say, an earthquake that destroys some existing capital? Clearly, if the earthquake does not affect

[1] A neater, but less economically meaningful way to show that V will go to zero, whatever its initial value, is to note that since equation (2) is $SY = C\dot{Y} + KV$, from (5a) and (2) we can write:

$$\dot{V} + KV = 0$$

Since $K > 0$, V must go to zero, whatever its initial value. This is Rose's argument.

the existing level of income or its rate of growth desired investment will rise. And remember, this is a Keynesian (demand determined) world, not a classical (supply determined) world. In Harrod's model there is an implicit assumption that there are always ways to increase output so long as the economy is not at what Hicks later calls the ceiling (which corresponds to Harrod's natural rate of growth). If we think as strict Keynesians the earthquake will have no direct effect on income produced. Income is simply investment times the multiplier; any other level does not clear the goods market.[1] Thus if the earthquake does not drop the ceiling below the pre-earthquake level of income the direct affect will be greater employment of labour and more intensive use of the smaller capital stock, but save during the period when employment is being expanded,[2] no fall in income. The indirect effect will be an increase in the rate of growth of investment and thus of income.[3]

But equation (3) says just the opposite. An increase in V, caused by an earthquake, will, in equation (3), decrease $\frac{\dot{Y}}{Y}$. This is strange. In our Keynesian world a fall in the rate of growth of income must be the result of a fall in the rate of growth of investment, which, we have argued, will be increased to compensate for the destruction of capital, not decreased.

What is happening is this. If the plans of investors are such that prior to the earthquake equation (3) holds, then plans will be revised after the earthquake so that equation (3) no longer holds. Equation (3) states that the rate of growth of income must fall if V suddenly increases IF investors are to be satisfied. But it would appear that the reaction of investors to the earthquake and the sudden increase in V will be to increase their planned investment, and thus to increase the rate of growth of income. One may assume that equation (3) always holds—that it tells what the rate of growth of income *will* be—but this assumption seems devoid of economic content. Rather, it seems much more realistic to assume that equation (3) states what the rate of growth of income *must* be if investors are not to change their policies. It is a warranted growth equation, not an explanation of the actual rate of growth.

To see this another way, assume that for some time $\frac{\dot{Y}}{Y}$ had equalled $\frac{S}{C}$ and V has been zero. *Ex-post* investment has always been such as to keep V zero, and entrepreneurs have been content. Assume that suddenly, for some reason, perhaps an increase in autonomous investment, $\frac{\dot{I}}{I}$ and $\frac{\dot{Y}}{Y}$ in-

[1] Why the goods market is cleared rather than the factor market is something to which nobody has given a really satisfactory answer.

[2] An increase in the output capital ratio in the short run, stimulated by either a rise in demand or destruction of capacity, is *not* inconsistent with a constant long-desired C.

[3] Remember, in the Harrod model decision makers react to disequilibrium conditions by adjusting rates of growth.

crease. Thus $\frac{\dot{Y}}{Y}$ will rise above $\frac{S}{C}$. From equation (5b) we know that this spurt in income will result in a capital shortage—output will grow faster than capacity—and from equation (1) we have reason to believe that this will tend to push up investment, which will further increase demand, and so on in the familiar Harrod spiral. But equation (3) says that the increase in $\frac{\dot{Y}}{Y}$ must be matched by a negative V, or capital surplus. And so it must, if the system is not to explode and if investors are to be happy with what they have done. But unfortunately V will go positive, not negative, as a result of the sudden increase in investment. Although actual investment has equalled planned investment, because of the induced increase in demand the result has been an increase in capital shortage.

A good part of the trouble here is that neither Harrod nor Rose has an equation that tells what the rate of growth of income will be. They have an equation that tells only what it must be, if investors are to be satisfied, and Rose has contributed in an important way to this analysis. In order to analyse stability we must be able to examine the actual path of the system. One way to make the time path of income deterministic is to introduce a lag, explicitly, as Hicks does. Another way is to introduce an adjustment equation, an equation that tells *how* plans will be changed if policies are not proving satisfactory. Rose, in another section of his paper, has suggested such an approach, and I shall follow it here.

III. The Actual Path of Income and the Stability of the Model

Before presenting a formal analysis that explains the time path of income in Harrod–Domar systems it is well to describe briefly the plans and actions that are made in the model economy, and their interactions that determine *ex-post* magnitudes. At any given time entrepreneurs, in their role as investors, make investment plans; in their role as producers they may make production plans. Consumers make consumption and saving plans. There are two alternative descriptions of how *ex-post* magnitudes result from *ex-ante* intentions. One, which we have dealt with in Section II and which seems to fit Rose, describes production as adjusting instantly so as always to equal investment demand plus consumption demand. *Ex-ante* plans thus are always fulfilled. Investors adjust their investment plans (and the actual rate of investment) so as to achieve a satisfactory capital–output ratio.

The second description, which seems to fit Harrod better,[1] views actual production as less quick to respond to changing demand. If demand exceeds planned production there will be a backlog of unfilled orders and a depletion of inventories. If demand is less than planned production there will be an

[1] Although Rose, in a footnote, argues that Harrod probably would agree with his position.

unplanned increase in inventories. Entrepreneurs adjust their production plans so as to keep inventories at a satisfactory level.

It is hardly surprising to those who have always felt that the two models come to the same thing that the differential equations explaining the time rate of aggregate income are much the same for both interpretations. Unfortunately there are many differential equations that seem to capture more or less adequately the behaviour we expect in the two systems. And not all of these equations give the Harrod–Domar conclusions in an obvious way. In this paper, however, we will examine an equation that yields the Harrod–Domar conclusions very neatly, but given the Rose amendment to the desired investment equation, with a quite interesting side twist.

Because the second interpretation above seems the more realistic of the two, and because the analysis is more straightforward, we shall focus our attention on it. Demonstration that the flexible production version can yield the same equation is relegated to a footnote.[1]

[1] In the flexible production version of the model investment plans are always satisfied. Assume that entrepreneurs adjust their plans to keep capital stock reasonably close to CY. If capital stock does not exactly equal CY investors may not try to force V (capital shortage) to zero all at once, for there may be added costs of adjusting very quickly. However, if V is positive investors will try to reduce V; if V is negative (there is capital surplus) investors will try to increase V (reduce capital surplus).

Assume that the satisfactory rate of adjustment is $-K$, where K is a number between zero and one. Thus if $\dot{V} = -KV$ entrepreneurs are content with the way things are going. Although there may presently be a capital surplus or shortage, it is decreasing at a satisfactory rate.

Consider the case in which there is capital shortage, that is $V > 0$. If $\dot{V}$ is positive, clearly investors will be dissatisfied and will try to increase the rate at which capital is growing. If $\dot{V}$ is negative (that is, capital shortage is decreasing), investors may or may not be satisfied. If $\dot{V} > -KV$, then though capital shortage is being decreased, it is not decreasing at a fast enough rate. On the other hand, if $\dot{V} < -KV$ the capital shortage is being eliminated too rapidly, given the costs of adjustment.

Consider next the case in which there is capital surplus, that is, V is negative. If $\dot{V}$ is also negative, so that capital surplus is increasing, then clearly investors will be dissatisfied and will try to cut back the rate at which capital is growing. If $\dot{V}$ is positive things will be moving in the right direction. But if $\dot{V} < -KV$ ($-KV$ is positive, since V is negative), the adjustment is not fast enough, and investors will try to cut back further on the rate of growth of capital. On the other hand, if $\dot{V} > -KV$ the capital surplus is decreasing too rapidly, and investors will tend to start investing more again.

Thus, in either case if $\dot{V} > -KV$, thus $\dot{V} + KV > 0$, investors will act to increase the rate of growth of capital; and if $\dot{V} < -KV$, thus $\dot{V} + KV < 0$, investors will act to decrease the rate of growth of capital.

Unfortunately it is not always true that in order to increase the rate of growth of the capital stock investors must increase the rate of growth of investment, and to decrease the rate of growth of the capital stock investors must decrease the rate of growth of investment. But if we assume that investors do step up $\frac{I}{I}$ when they wish to step up $\frac{\dot{X}}{X}$ and decrease $\frac{I}{I}$ when they wish to decrease $\frac{\dot{X}}{X}$, then the Rose–Domar model is easily formulated as:

$$d/dt\left(\frac{I}{I}\right) = f[\dot{V} + KV];\ f' > 0, f(0) = 0$$

Since from (5) we know that $V = CY\left[\frac{\dot{Y}}{Y} - \frac{S}{C}\right]$; and since $\frac{I}{I} = \frac{\dot{Y}}{Y}$,

$$d/dt\left(\frac{\dot{Y}}{Y}\right) = f[CY\left(\frac{\dot{Y}}{Y} - \frac{S}{C}\right) + KV]$$

But this is equation (6b).

Assume that the rate of *ex-ante* investment is determined by equation (1). That is, assume that new orders for investment goods are determined by the existing capital shortage and the rate at which income is increasing. We know that *ex-post* investment must equal actual savings; thus the difference between *ex-ante* and *ex-post* investment is $C\dot{Y} + KV - SY$. This difference represents unintended inventory change or the accumulation of back orders.

In the Harrod model plans are made in terms of intended rates of growth of output or investment. In the interpretation of the model we are exploring here, if $C\dot{Y} + KV + SY = 0$ (*ex-ante* investment equals *ex-post* investment) plans will not be changed and $\frac{\dot{Y}}{Y}$ will remain constant. However, when $C\dot{Y} + KV - SY > 0$ producers will be motivated to step up $\frac{\dot{Y}}{Y}$ and when $C\dot{Y} + KV - SY < 0$, to reduce $\frac{\dot{Y}}{Y}$.

The assumption that plans are for a given $\frac{\dot{Y}}{Y}$ may be critical to the model. If plans are made in terms of Y, such that when *ex-post* and *ex-ante* investment are equal, Y is kept constant, the reader may verify that the dynamic adjustment equation leads to economic nonsense. If plans are made in terms of $\dot{Y}$ the situation is no better.

Given that plans are a specification of an intended $\frac{\dot{Y}}{Y}$, we may write:

$$\text{(6a)} \qquad d/dt\left(\frac{\dot{Y}}{Y}\right) = f[C\dot{Y} + KV - SY];\ f' > 0, f(0) = 0$$

or

$$\text{(6b)} \qquad d/dt\left(\frac{\dot{Y}}{Y}\right) = f\left[CY\left(\frac{\dot{Y}}{Y} - \frac{S}{C}\right) + KV\right]$$

Let us rewrite equation (5b) here for convenience:

$$\text{(5b)} \qquad \dot{V} = CY\left[\frac{\dot{Y}}{Y} - \frac{S}{C}\right]$$

and work with the system of equations (5b) and (6b). If we had the right functional form, f, and the initial conditions we could plot time paths of $\frac{\dot{Y}}{Y}$ and V. This Harrod and Domar cannot do with their formulation of the model.

Let us examine the stability properties of equations (5b) and (6b). Clearly, if $V_0 = 0$ and $\left(\frac{\dot{Y}}{Y_0}\right) = \frac{S}{C}$, then V and $\frac{\dot{Y}}{Y}$ will hold these values for ever in the absence of perturbations. But if this path is ever perturbed so that either $\left(\frac{\dot{Y}}{Y_0}\right) > \frac{S}{C}$ and $V_0 \geqslant 0$, or $\left(\frac{\dot{Y}}{Y_0}\right) \geqslant \frac{S}{C}$ and $V_0 > 0$, then $\frac{\dot{Y}}{Y}$ and V will both increase through time until Harrod's natural rate of growth, or

Hicks' ceiling, is reached. And if the time path is ever perturbed so that $\left(\frac{\dot{Y}}{Y_0}\right) < \frac{S}{C}$ and $V_0 \leqslant 0$, or $\left(\frac{\dot{Y}}{Y_0}\right) \leqslant \frac{S}{C}$ and $V_0 < 0$, then both $\frac{\dot{Y}}{Y}$ and V will fall. When $\frac{\dot{Y}}{Y}$ becomes negative equation (6a) no longer will hold, but presumably $\frac{\dot{Y}}{Y}$ will continue to decline until some sort of a floor is reached. This is what Harrod and Domar mean when they say the system is unstable.

But Rose has argued that there is no reason why both V and $\frac{\dot{Y}}{Y}$ need be perturbed away from their equilibrium values in the same direction. And if they are not, what then? What if the system is perturbed so that $\left(\frac{\dot{Y}}{Y_0}\right)$ is greater than $\frac{S}{C}$ but V_0 is negative? Then the initial rate of growth of income will be greater than the equilibrium rate of growth, and this by itself will tend to make $\frac{\dot{Y}}{Y}$ grow even larger, but the initial capital surplus will, by itself, tend to decrease $\frac{\dot{Y}}{Y}$. Or what if $\left(\frac{\dot{Y}}{Y_0}\right)$ is less than $\frac{S}{C}$, but V_0 is positive? Then the initial rate of growth of income is less than the equilibrium rate, and this by itself will tend to make $\frac{\dot{Y}}{Y}$ fall to an even lower level. But the initial capital shortage will, by itself, tend to increase $\frac{\dot{Y}}{Y}$. Factors are clearly working in opposite directions in these cases. Is it possible that the system can return to equilibrium without boom or bust? Since the relevant equations are not linear, it is helpful to examine the problem geometrically.

In Fig. 1 $\frac{\dot{Y}}{Y} - \frac{S}{C}$ is plotted horizontally and V is plotted vertically. The arrows in the various sub-areas of Fig. 1 tell the direction of movement of $\frac{\dot{Y}}{Y}$ and V for any value they may take on at any time. From equation (5b) we know that to the right of the origin $d/dt(V)$ is positive, and to the left of the origin d/dt (V) is negative. Thus in Fig. 1 the vertical arrows, which indicate how V is changing, point up on the right side of the origin and down on the left side. From equation (6b) we know that $d/dt\left(\frac{\dot{Y}}{Y}\right)$ is positive if the expression $YC\left[\frac{\dot{Y}}{Y} - \frac{S}{C}\right] + KV > 0$, and negative if the expression is negative. Thus in Fig. 1 the horizontal arrows, which indicate how $\frac{\dot{Y}}{Y}$ is changing, point to the right on the right side of the diagonal line, and to the left on the left side of the diagonal line.

It is obvious, both from our previous analysis and from Fig. 1 that if V and $\frac{\dot{Y}}{Y}$ are initially in the north-east quadrant they will both grow; if they are initially in the south-west quadrant, they will both fall. From Fig. 1 we can see that the region of instability is not confined to these two quadrants. Only if initial conditions are in the shaded area is there any hope that the system will not continuously accelerate or decelerate. If the initial values of $\frac{\dot{Y}}{Y}$ and V are in the shaded wedges the system may move to the center and to equilibrium. It is strictly touch and go, for if the time path of $\frac{\dot{Y}}{Y}$ and V runs into the boundary of the shaded region before it reaches the centre

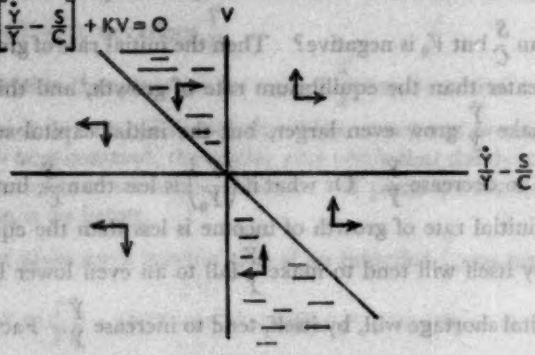

FIG. 1

the system will explode. But if the time path stays in the shaded region and reaches the centre the system from then on will have $\frac{\dot{Y}}{Y}=\frac{S}{C}$ and $V=0$.[1] Thus there is a possibility that the system can reach equilibrium, even though the initial conditions are not the steady state. Or, to put the matter another way, there is a chance that the system, if perturbed from equilibrium, can return to it.

Unfortunately there is not much of a chance. It is shown in the Appendix that only if the initial conditions of V and $\frac{\dot{Y}}{Y}$ are on a curve passing through the origin can the system ever reach equilibrium. Or if we are considering perturbations from equilibrium, only if V and $\frac{\dot{Y}}{Y}$ are perturbed so that they fall along that curve will the system return to equilibrium.

[1] Unfortunately the analysis is complicated by the fact that the diagonal line pivots as the economy grows. If $\frac{\dot{Y}}{Y}$ is positive, as we assume it is, Y is increasing and the line rotates clockwise and squeezes the shaded area. Since the economic meaning of this phenomenon is not clear, it will not be treated here.

Since generally it is assumed that only if $\frac{\dot{Y}}{Y} = \frac{S}{C}$ and $V = 0$ initially will the system not explode, the correct conditions, a curve rather than a point, should give some comfort to those who feel that instability in a simple model implies instability in the economic world. But the model is still razor's edge. That the world is not must be explained by mechanisms not in the equations of the formal model—neo-classical mechanisms and government policy.

IV. Booms, Busts and Crawling Along the Ceiling

When adjustment behaviour is treated explicitly it seems clear that the Harrod–Domar model is miscast as a long-run growth model. The omission of autonomous investment which will almost certainly vary greatly over the long run, the assumption of a relatively constant desired capital–output ratio, the determination of changes in the rate of growth of investment and income from demand considerations alone just won't do for long-run analysis. Viewed in this context, it is clear that Hicks was right in arguing that what bite the model has must be as a shorter-run boom-and-bust model; a model treating periods of time sufficiently short so that autonomous investment varies little, and the desired capital–output ratio stays relatively constant.

Hicks introduced lags into the system to make the time path determinate.[1] Since our system is already determinate, if we introduced a ceiling and a floor and took into account that fact that when $\frac{\dot{Y}}{Y}$ is negative the rate of capital decumulation is limited by the rate of depreciation we would have much the same system as Hicks, with all the same logical and empirical difficulties.

It has recently been shown that Hicksian-type cycle models need not bounce down when they hit the full-employment ceiling.[2] Instead, they may tend to "crawl along the ceiling," that is, stay at full employment. Matthews has shown that in the second-order pure-accelerator version of the model if the system does not rebound from the ceiling on impact, then, in the absence of shocks, it will crawl along the ceiling for ever. How much more interesting it would be if, at the top of a boom, the model stayed at the full-employment ceiling for a while and then fell back. This seems a much better description of reality. Our model tends to do just this.[3]

Consider what happens when the economy hits the ceiling. Let the ceiling rate of growth of income be G. At the ceiling the rate of growth of income cannot be any greater than G; thus, at the ceiling, equation (6b) must be rewritten

$$d/dt\left(\frac{\dot{Y}}{Y}\right) = \text{Min.}\left[\int_0 [CY\left(G - \frac{S}{C}\right) + KV]\right] \tag{8}$$

[1] Hicks does not generate his cycles from the second-order properties of his system.

[2] The point is due to James Duesenberry in his *Business Cycles and Economic Growth* (New York, 1958). It has been interestingly explored by R. C. O. Matthews in the reference cited earlier.

[3] A model with distributed lags may also have this property.

Although it is a theoretical possibility for the economy to hit the ceiling with capital redundancy, it seems unlikely. Let us therefore assume that V is positive in equation (8). There are three possibilities to consider. The economy can crawl along the ceiling for ever, it can rebound immediately from the ceiling or it can crawl along the ceiling for a period of time and then fall away.

From (8) and (5b) we can see that if G exceeds $\frac{S}{C}$, then $\frac{\dot{Y}}{Y}$ will grow at the ceiling rate for ever, and, from (5b), we can see that V will grow larger and larger.

If G is less than $\frac{\dot{Y}}{Y}$, then the economy can either rebound immediately or crawl along the ceiling for a while. By inspection of (8) it is clear that it all depends on whether

$$\frac{V}{Y} \lesseqgtr -\frac{K}{C\left(G-\frac{S}{C}\right)} = Q \tag{9}$$

If $\frac{V}{Y} > Q$ the economy will rebound when it hits the ceiling. If $\frac{V}{Y} < Q$ the economy will stay at full employment for a while. But if $G < \frac{S}{C}$ the economy must eventually fall back.

To prove that the economy must eventually fall back from the ceiling if G is less than $\frac{S}{C}$, differentiate $\left[CY\left(G-\frac{S}{C}\right)+KV\right]$ with respect to time, taking $\dot{V}$ from equation (5b).

$$d/dt\left[CY\left(G-\frac{S}{C}\right)+KV\right] = C\dot{Y}\left(G-\frac{S}{C}\right)+KCY\left(G-\frac{S}{C}\right) \tag{10}$$

This first derivative is negative if $G < \frac{S}{C}$. It is easily shown that the second derivative is also negative. Thus, though $f\left[CY\left(G-\frac{S}{C}\right)+KV\right]$ may be positive when the economy first hits the ceiling, as the economy crawls along the ceiling V, and thus $\frac{V}{Y}$, will fall. As the ratio of capital shortage to income falls, investment will fall and $\left[CY\left(G-\frac{S}{C}\right)+KV\right]$ must finally become negative, and when it does, the economy must drop back from the ceiling and start a downward spiral.

Equation (9) shows that, other things being equal, the economy will tend to stay at full employment for a while at the top of a boom if both K and G are relatively large. This is intuitively very reasonable. K measures the extent to which current investment decisions are determined by general

conditions of capital scarcity, as opposed to short-run changes in demand. G measures how fast demand can be increasing at the ceiling. If K is zero, then current investment demand is determined solely by changes in income, and a deceleration of growth will turn the economy down, even if there exists pressing capital shortage. If K is large, then current investment is relatively insensitive to short-run variations in the rate of growth of demand, and the slowing down of income growth at the top of a boom will not cut back investment demand sharply if there exists a general condition of capital scarcity. If G is small, then the rate of growth of demand at full employment is small, and high investment demand can be maintained only if there exists considerable capital shortage. If G is large, then since the full-employment growth of demand can be large, high investment demand can be maintained for a while even if there is little capital shortage.[1]

IV. Conclusions

In this paper we have examined some of the implications of introducing into the desired investment equation of a Harrod–Domar model a term relating to the existing state of capital shortage or surplus. The amendment scarcely cuts sharply at the many valid criticisms of the model as a description of reality. Nor is the idea novel—both Harrod and Domar talk about it in their original papers—but Mr. Rose, to my knowledge, was the first to introduce such a term formally. The results are quite interesting. The model is still marked by great instability, but after some perturbations the economy can return to equilibrium. One wonders if the introduction of other variables would significantly increase the range of stability. Further, an economy described by the model is capable of rather lengthy periods of full-employment growth at the top of a boom. Again one wonders what

[1] I have been unable to develop a satisfactory analysis of what happens to $\frac{V}{Y}$ in the course of an upswing, but it would seem that if G is large $\frac{V}{Y}$ is likely to be large when the economy hits the ceiling, thus reinforcing the argument that when G is large the economy will tend to crawl along the ceiling at the top of a boom. Differentiating $\frac{V}{Y}$ with respect to time:

$$d/dt\left(\frac{V}{Y}\right) = C\left[\frac{\dot{Y}}{Y} - \frac{S}{C}\right] - \frac{V}{Y}\frac{\dot{Y}}{Y}$$

Thus $\frac{V}{Y}$ will be growing if

$$\left(\frac{V}{Y}\right) < \frac{C\left[\frac{\dot{Y}}{Y} - \frac{S}{C}\right]}{\left(\frac{\dot{Y}}{Y}\right)}$$

The larger G is, given the height of the ceiling at the start of a boom, the larger will be $\frac{\dot{Y}}{Y}$ when the economy hits the ceiling at the top of a boom. And a large $\frac{\dot{Y}}{Y}$ implies either a large $\frac{Y}{\dot{Y}}$ or a a growing $\frac{V}{Y}$.

effect the introduction of neo-classical variables would have. Perhaps the model is not such a fruitless base for further theorising as it currently seems fashionable to argue.

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APPENDIX

Let $\frac{S}{C} = \alpha$, $\frac{\dot{Y}}{Y} - \frac{S}{C} = X_1$, $V = X_2$ and $f'(0) = h$

Then for a very small perturbation from $X_1 = 0$, $X_2 = 0$ at time $t = 0$

$$(1) \qquad \frac{dX_1}{dt} = hCY_0e^{\alpha t}X_1 + hKX_2$$

$$\frac{dX_2}{dt} = CY_0e^{\alpha t}X_1$$

Let $S = \frac{e^{\alpha t}}{\alpha}$, $dS = e^{\alpha t}dt$, $d/dS = \frac{1}{\alpha S}\,d/dt$

Let $\frac{dX_1}{dS} = \dot{X}_1$, $\frac{dX_2}{dS} = \dot{X}_2$

$$(2) \qquad \begin{aligned} \alpha S\dot{X}_1 &= \alpha ShCY_0X_1 + hKX_2 \\ \alpha S\dot{X}_2 &= \alpha SY_0CX_1 \end{aligned}$$

Differentiating the first equation again,

$$(3) \qquad \alpha S\ddot{X}_1 - \alpha ShY_0C\dot{X}_1 - hKCY_0X_1 + \alpha\dot{X}_1 - \alpha hY_0CX_1 = 0$$

Let $hY_0C = a$, $\frac{hKCY_0}{\alpha} = b$, and divide by αS

$$(4) \qquad \ddot{X}_1 - a\dot{X}_1 + \frac{1}{S}\left[\dot{X}_1 - (b+a)\,X_1\right] = 0$$

Let $X_1 = e^{\frac{aS}{2}}Y$

$$(5) \qquad \dot{X}_1 = e^{\frac{aS}{2}}\dot{Y} + Y\frac{a}{2}e^{\frac{aS}{2}},\ a\dot{X}_1 = ae^{\frac{aS}{2}} + \frac{a^2}{2}Ye^{\frac{aS}{2}}$$

$$\ddot{X}_1 = e^{\frac{aS}{2}}\ddot{Y} + a\dot{Y}e^{\frac{aS}{2}} + Y\frac{a^2}{4}e^{\frac{aS}{2}}$$

Substituting (5) in (4) and dividing by $e^{\frac{aS}{2}}$

$$(6) \qquad \ddot{Y} - \frac{a^2}{4}Y + \frac{1}{S}\left[\dot{Y} + \frac{a}{2}Y - (b+a)\,Y\right] = 0$$

Let $Y = ZS^{-1/2}$

$$(7) \qquad \dot{Y} = S^{-1/2}\dot{Z} - \tfrac{1}{2}ZS^{-3/2},\ \frac{\dot{Y}}{S} = S^{-3/2}\dot{Z} - \tfrac{1}{2}ZS^{-5/2}$$

$$\ddot{Y} = S^{-1/2}\ddot{Z} - S^{-3/2}\dot{Z} + \tfrac{3}{4}ZS^{-5/2}$$

Substituting (7) in (6) and dividing by $S^{-1/2}$

$$\ddot{Z} - \frac{a^2}{4}Z + \left[\tfrac{1}{4}ZS^{-2} - \left(b + \frac{a}{2}\right)ZS^{-1}\right] \tag{8}$$

As $S \to \infty$ the last term goes to zero. From Bellman, p. 126,[1] we know that (8) has two solutions for large S:

[1] R. E. Bellman, *Stability Theory of Differential Equations* (New York: McGraw-Hill, 1954).

$$(a) \qquad Z_1(S) \approx e^{\frac{aS}{2}}$$

$$(b) \qquad Z_2(S) \approx e^{\frac{-aS}{2}}$$

The second solution is the interesting one. For just the right initial conditions all the weight will be on it and $Z_2(S) \to 0$ as $S \to 00$.

Tracing back to $X_1(t)$,

$$(9) \qquad Z(S) \approx e^{\frac{-aS}{2}}$$

$$Y(S) \approx S^{-1/2} e^{\frac{-aS}{2}}$$

$$X_1(S) \approx S^{-1/2} e^{\frac{-aS}{2}} e^{\frac{aS}{2}} = S^{-1/2}$$

$$X_1(t) \approx \left(\frac{e^{2t}}{\alpha}\right)^{-1/2} = \alpha^{1/2} e^{-1/2\alpha t}$$

Thus $X_1(t) \to 0$ as $t \to \infty$.

A TAX ON PRICE INCREASES?[1]

I. Introduction

The problem of reconciling price stability with full employment and a satisfactory rate of economic growth in modern conditions has not yet been solved in this country. Some of the measures which have been used, or proposed, are listed in the second part of this article. The purpose of the very brief discussion in that part is to open the reader's mind to the proposal put forward in the third part. If the alternatives are all so unsatisfactory, there is more to be said for the introduction of a new tax which would tend to reduce the rate of increase in prices, despite the undoubted administrative and other difficulties which would have to be faced. The way in which the tax would slow down price increases is discussed in the fourth part, and objections to it are considered in the fifth part.

The writer is not an expert in public finance. Those who are may doubt the feasibility of the proposed tax, and may detect difficulties which he has not noticed. He pleads, all the same, for a sympathetic hearing. It is not enough to say that there would be great difficulties. One must be prepared to defend the *status quo* or else to suggest alternatives. Most people are dissatisfied with the former, and, although there is undoubted merit in some of the proposals mentioned below, they, too, have their difficulties. Let the experts, then, consider ways in which the proposed tax could be improved, and not just the reasons why it must be rejected!

II. Other Ways of Slowing Down the Increase in Prices

The three main ways in which successive governments have attempted to prevent prices rising in this country since the War have been price control, appeals to trade unions and employers for restraint in increasing wages or profits and various fiscal and monetary measures designed to reduce demand.

Price control did not prevent prices rising, perhaps largely because two important sets of prices—wages and import prices—were not controlled. Reintroduction of price control might mean reintroduction of rationing. It might be difficult to enforce without the co-operation of industry, and in the absence of any real emergency such co-operation might not be given. Price control tends to freeze the existing pattern of prices, and ultimately leads to an abandonment of the market mechanism.

[1] The stimulus which provoked this article was provided by a discussion on the problem of inflation arranged by Mr. T. Balogh, opened by the Governor of the Commonwealth Bank of Australia and attended by many distinguished economists, some of whose ideas are very briefly mentioned in the second part of the article. The writer has also benefited from the criticisms made of an earlier draft by Sir Roy Harrod and Sir Donald MacDougall.

Appeals for restraint have had some effect, notably in the "wage-freeze" of 1948–49; but, again, they are less effective when there is no real emergency. One can hardly expect trade-union leaders to act as a *permanent* curb on the wage demands of their rank and file. They would probably lose their jobs if they did. Similarly, one can hardly expect the boards of companies to follow a settled policy of charging lower prices for their products than they think would be in their companies' long-term interests.

Reductions in the pressure of demand for goods and services have certainly had their effect on the general level of prices and wage-rates; but they have also reduced output and employment and, at least temporarily, slowed down the rate of growth of the economy. There is no doubt that demand has at times been excessive, so that a reduction in demand has helped not only to slow down price increases but also to remove shortages, cut down delivery delays, empty order books which were too full and generally increase the flexibility and efficiency of the economy. But there is no law of economics which ensures that when demand is such that the economy as a whole is working at its optimum rate it will also be such as to ensure that prices do not rise. Some people may still believe in the existence of such a law, but their number is surely dwindling.[1] But if there is no such law, one may be faced (and we have in fact been faced) with the choice between operating the economy below the optimum rate, so as to keep down the rate of increase in prices, and keeping it up to the optimum, despite the faster rate of price increase which this implies. This is an unpleasant choice to make—hence the numerous proposals which have been made for other measures which would reduce the rate of increase in prices. These proposals, for the most part, have not yet been accepted by the Government.

There are several proposals which may be collectively described as "a deal with the trade-unions." The elements in the deal vary. On the union side there might have to be an attempt to keep wage demands down to a figure which would be consistent with stable prices. The Government, in return, might guarantee to stabilise the cost of living, if necessary by means of subsidies. Or it might freeze dividends, or tax capital gains, or simply undertake to ensure, by some fiscal means, that profits after tax would grow no faster than wages after tax. The deal might be a once-and-for-all affair, or it might become a more highly centralised annual wage negotiation between the unions and the employers, with the Government holding the ring. By bringing all the main parties involved together into one simultaneous negotiation, one might hope that the futility of "leap-frogging," and of granting increases which were plainly incompatible with price stability, would be recognised. The Government might put forward

[1] The distinguished authors of the Radcliffe Report have added the weight of their opinion to those who recognise the possibility of a conflict between "a high and stable level of employment," "steady economic growth" and "reasonable stability of the internal purchasing power of money." See Cmnd. 827, paras. 69 and 70.

an average figure for all wage increases which it thought could be absorbed by increases in productivity, without increasing wage costs and prices.

Some difficulties which proposals of this type encounter are as follows. First, the unions seem wedded to the present system of collective bargaining, and reluctant to exchange it for a more centralised system. Such a system might reduce the freedom and power of the leaders of the individual unions, and is suspected of being "wage restraint" in another guise, or perhaps even the thin end of the wedge of government control of wages. Secondly, it is not easy to devise a suitable form of limitation on profit increases which could be exchanged for a limitation on wage increases. Given the present nature of the economy, profits are essentially a residual in the cost-structure, and are very variable from firm to firm or, within any one firm, from year to year. Thirdly, it is by no means self-evident that the best way to decide the division of the national income between wage-earners and profit-earners is by means of a highly centralised process. It may be better for political peace, and possibly also for economic growth, to let this division be settled by a decentralised process, and to confine political attention to policies which affect the distribution of incomes and wealth between persons, as at present. Fourthly, even if some centralised form of negotiation could be devised and put into practice, there would be the problem of enforcing the decisions. What sanctions could be used against firms or groups of workers that refused to abide by them? Finally, the experience of some other countries which have been able to negotiate centralised wage settlements is not very encouraging.

A different kind of proposal is to alter the typical wage contract so as to make the wage-rate for any particular occupation increase with the age of the worker.[1] At present most workers probably attain the maximum wage-rate in their particular job in their twenties. Thereafter, it is to a general increase in wage-rates that they must look, for the most part, if they are to increase their earnings. This position contrasts sharply with that of the typical salary earner, who can look forward to a series of increases in his earnings as he grows older, irrespective of any general rise in the whole scale of pay. Some of the pressure for wage increases might be reduced if wage-earners were placed in a similar position. Every individual worker could then be given periodical increases in pay without there being any rise in average rates of pay at all. While this proposal has much to commend it, it is not clear how it could be brought into effect by the Government. It might increase the difficulties facing older workers looking for a job. It would still leave the trade-union leaders with an incentive to secure the maximum pay increase for their members, and it is not clear that it would stiffen the employers' resistance to their demands.

The last might be effected by measures to sharpen competition between

[1] The original idea is Sir Donald MacDougall's. Its full implications have yet to be worked out.

firms—desirable on other grounds as well, in some people's view. Such measures might include tougher legislation against monopolies and restrictive practices, and greater freedom of entry for imports. Political possibilities, the balance of payments and the willingness of other countries to make reciprocal tariff reductions, all set limits on the extent and rapidity of changes of this kind. The Government may already be doing virtually all that can be done, and yet this may not be enough to secure price stability.

III. A Proposal to Tax Price Increases

The writer is not opposed to all the suggestions which have just been examined. The problem of price stability can probably best be tackled by a combination of different policies. One which seems to him worth considering is the following proposal to tax price increases.

The essential change proposed is to make the rate of profits tax payable in respect of a given year by any company vary with the average increase or decrease in the prices of the goods and services sold by it in that year as compared with the previous year. The exact rates of tax would need to be chosen carefully, and adjusted in the light of experience. The following table of rates is given purely to illustrate and clarify the proposal:

Average percentage change in prices of goods sold from last year to this year.	Profits tax payable in respect of this year, as a percentage of taxable profits.
−6 to −5	0
−5 to −4	2
−4 to −3	4
−3 to −2	6
−2 to −1	8
−1 to 0	10
0 to 1	12
1 to 2	14
2 to 3	16
etc.	etc.

If the prices of a firm's products decreased on average by more than 6% in any year, it might be allowed to "carry forward" that part of the price reduction in excess of 6% to the next year, which would reduce the profits tax payable in that year.

Even if prices are stable on average for the economy taken as a whole, some prices are bound to rise and some to fall. The nature of the products sold by some firms is such that their prices must, almost inevitably, rise. To prevent these firms being very heavily penalised by the above system of profits tax, it should be possible to opt out of the system. Any firm which opted out would pay profits tax at a rate fixed, as at present, regardless of the increase in prices of its sales. Again, the exact determination of this rate would need careful consideration. It should be sufficiently high to ensure that enough firms would opt in for the scheme to be effective. On the other hand, it should not be so high as to cripple those firms which did

opt out. For the sake of illustration, we may suppose that firms which opted out permanently would pay a 15% profits tax.

Another reason for allowing firms to opt out, besides that just given, is that the nature of their products might be such as to defy all attempts to estimate changes in their prices. It would, for example, be very difficult to calculate the changes in the prices charged by a bank which charged nothing to customers holding current accounts, or indeed the prices charged by almost any financial intermediary (since a rate of interest is not the equivalent of a money price). The difficulty of measuring price changes is perhaps the most serious objection which can be made to the proposed tax. It would be lessened both by allowing some firms to opt out completely and by allowing firms which opted in to exclude up to, say, 10% of their sales from the calculation of the average price. A system of appeals would be necessary, and these and other matters are discussed below (pp. 362–4).

Although firms which opted out permanently would pay, say, 15% profits tax, it would be desirable to allow firms to opt out for a shorter period at their own choice, but to discourage them from doing so by charging them a higher rate of tax (say 25%) for the first year for which they opted out, this rate falling by degrees to the standard 15% if they remained out for a number of years. Such firms could opt in again at any time. The purpose of this provision would be to set an upper limit to the profits tax payable by a firm, so that in the event, for example, of a sharp rise in the prices of imported materials, firms using them would not be too heavily penalised. On the other hand, one would not want to set the upper limit too low, for example, at 15%, for this would allow firms which wanted to raise their prices to do so without suffering the penalty of an appreciably higher tax rate. In fact, a firm could raise its prices in one year by, say, 3½%, and lower them in the next year by, say, 2½%. If it opted out in the first year and paid only 15% profits tax, and opted in for the second year and paid 6% profits tax, it might do appreciably better than a firm which remained in throughout the period and raised its prices by the same average amount per annum, ½%. For such a firm would have to pay 12% tax each year. It is in order to avoid this opting in and out that the tax should be raised for the first year in which a firm opted out.[1]

IV. The Economic Effects of the Tax

Further details of the proposed tax are discussed in Part V, but enough has been said to enable us to examine its economic effects. These will be considered under three heads: the effects on prices, on the allocation of

[1] It is true that, even if the tax were raised, a firm could still lower its average rate of profits tax by opting in and out. However, it would then have to make appreciably larger fluctuations in the average prices it charged, and this might not pay. An alternative method of discouraging opting in and out would be to require any firm opting in to pay tax on that basis (*i.e.*, varying with price changes) not only for the year in which it came in but also for the previous, say, three years.

resources and on the general level of demand. Other effects (on incentives, growth, etc.) must be ignored in this brief discussion.

As the main purpose of the tax is to slow down the rate of increase in prices, it is this effect which will be given most attention here. To state the argument briefly: as things are at present, what matters for many firms is the level of their selling prices relative to their competitors' or relative to their own costs. It often does not matter much if all prices and costs go up together: it is *relative*, not *absolute*, price changes which matter. The effect of the tax is to make *absolute* price changes matter as well (*i.e.*, affect firms' profits). In this way an incentive is given to resist cost increases which is lacking, or weak, at present. The tax therefore affects the *collective* behaviour of firms when negotiating terms with their suppliers, of which the most important example is probably collective bargaining about wages. It is not thought that the tax would much affect the *individual* behaviour of firms in deciding, for example, what price and output policy to pursue in competition with other firms. Nor would it stop the more efficient firms from making larger profits than the less efficient firms, or the expansion of the former at the latter's expense. The reasons why it is thought that the tax would affect one sort of behaviour and not the other are given below. If they are correct, it is an important advantage of the tax, for it means that its pressure is applied to just that point where it is most needed. What is wanted is a measure which will affect the general level of prices without disturbing unduly the formation of relative prices by the normal competitive process.

In what follows, we shall consider a number of different possible market situations (imperfect competition with a large number of sellers, oligopoly with and without price leadership or price agreements and monopoly) and make a number of assumptions. It is realised that this involves a considerable degree of abstraction from reality, in which the number of different market situations is legion, and where each firm has its own special features. The writer hopes that, if the conclusions stated above can be shown to apply in these situations and under the given assumptions, then they will probably also apply to an important extent in the real world. In defence of this procedure it can only be said that it is customary, it is hard to follow a better one and the degree of abstraction is no greater than that used in many practical discussions of policy in government circles.

Consider, first, some firms in an industry which normally negotiate wage-rates as a group with a corresponding group of trade-unions. Let us suppose that these firms are numerous and small, so that we have what is known as the " large-group " case, where " any adjustment of price or of ' product ' [*i.e.*, quality of product] by a single producer spreads its influence over so many of his competitors that the impact felt by any one is negligible and does not lead him to any readjustment of his own situation."[1] In this

[1] E. H. Chamberlin, *The Theory of Monopolistic Competition*, 6th edition, Chapter V, p. 83.

case, firms may follow some sort of "full cost" pricing policy, that is, they may fix their prices by adding a customary percentage to their long-run average total costs. This procedure may or may not maximise profits. Under certain assumptions it can be shown that it will give a rough approximation to the price which equates long-run marginal cost and long-run marginal revenue, and so will enable them to maximise, approximately, long-run profits.[1] Now consider how these firms' profits are likely to be affected by a rise of, say, 1% in their average costs following a wage increase negotiated with the unions. Each firm will raise its prices 1%.[2] Let us suppose that, as a result of this general rise in prices, the sales of the firms fall in quantity by x%. The *value* of their sales will therefore fall by approximately $x - 1$%. Since their profit margins are unchanged, their profits before tax must also fall by approximately $x - 1$%. As income and profits tax take away a constant fraction of profits, profits after tax will fall in the same proportion. So long as x is small (less than 2, say) the firms will have only a weak incentive to resist the wage increase. Indeed, if x is less than 1, as is possible, they will have a weak incentive to accede to wage demands.

Now there are several reasons for thinking that x probably is small in a large number of cases, or, at least, that firms *think* it is small (for it is their estimate of x which matters). First, x may well be small in the short-run, and it may be the short-run effects of price increases which imprint themselves most strongly on the minds of business-men.

Second, even in the long-run, x is smaller than the long-run elasticity of demand for this group of firms' products (and, of course, probably much smaller than the elasticity of demand for any individual member of the group's products). For the wage or other cost increase will probably affect the costs of firms outside the group, including potential competitors. They are likely to use labour belonging to the same unions, or materials coming from the same sources, if they start producing these products. The only exceptions (and they may be important in some cases) are foreign firms. Apart from them, the long-run value of x will be the long-run elasticity of market demand for the firms' products, which may be appreciably less than the elasticity of demand allowing for potential competition.

Third, in so far as firms are confident that full employment will be main-

[1] If for each firm long-run average cost is approximately constant over the relevant range of output, then long-run average cost will equal long-run marginal cost. If we also assume that the elasticity of demand is constant for each firm, then we have as a condition for long-run profit maximisation l.a.c. = l.m.c. = l.m.r. = price $\left(1 - \frac{1}{e}\right)$, where e is the elasticity of demand. It follows that price = l.a.c. $\left(1 + \frac{1}{e-1}\right)$. Hence the price which maximises long-run profits is found by adding a fixed percentage $\left(\frac{100}{e-1}\right)$ to long-run average cost.

[2] Either because this is conventional or because, given the assumptions stated in the previous footnote, the new price which maximises long-run profits is 1% higher than the old one.

tained, they may be less afraid of a large drop in sales resulting from an increase in prices.

Finally, the prevalence of cost inflation is itself a reason for supposing that firms have only a weak financial incentive to resist cost increases. It is argued below that there are other typical market situations, besides the large-group case, in which similar forces operate. Let us provisionally assume that this is so. Then it seems hard to believe that, if x were large (say 5 or more) for most groups of firms, cost inflation would be such a problem. On the contrary, one of the main reasons why cost inflation has apparently grown so much in importance is probably the growth in collective bargaining and the increase in the proportion of any one industry's labour-force which is covered by each negotiation. Local agreements have given way to regional agreements, and these in turn to national agreements, and at each stage the relevant value of x has been reduced. One does not expect cost inflation in a predominantly rural economy, or in an economy where a very large fraction of total output is exported. Its importance in the United Kingdom may be largely due to the system of wage-fixing by large groups and to the relatively modest proportion of total output which is exported.[1]

How would the proposed profits tax alter matters? If the firms in our hypothetical large group successfully resisted the wage increase their costs, prices and profits would not change. Out of profits of £100, say, each firm would have available after tax £50 (assuming a 10% profits tax and a 40% income tax).[2] If the wage increase were granted and if prices were raised by 1%, profits before tax would, as before, be reduced by $x - 1\%$, and so £100 of profit would become £100 $-$ $(x - 1)$. But the rate of profits tax would now go up to 12% (following the schedule on p. 353). Hence profits after tax would amount to approximately £48 $-$ $\binom{x-1}{2}$ and so would fall by approximately $x - 1\%$ *plus* £2, that is, they would fall by 4% more than under the present system of taxation (when the fall would be only $x - 1\%$). So the effect of the proposed tax would be that for every 1% increase in price, profits after tax would be approximately 4% lower than

[1] Although foreign trade is extremely important for the United Kingdom, by comparison with many other countries the fraction of national output exported is not large (there are probably twice as many countries (outside the Iron Curtain) for which the ratio of exports to the gross national product is higher than the ratio for the United Kingdom than there are countries for which it is lower, to judge by such statistics as are readily available). The importance of imports lies more in their particular composition (they supply about half our food and a large proportion of raw materials) than in their magnitude. Furthermore, until fairly recently we were the dominant supplier of manufactures in many of our export markets, and so our business-men may have tended to underestimate the extent to which we could lose business in the long-run as a result of raising prices.

[2] This is equivalent to 8*s.* in the pound, which is slightly more than the existing standard rate of 7*s.* 9*d.*, but makes the calculation simpler. Profits tax was increased from 10 to 12½% in the Budget of April 1960.

under the existing tax system. If x is small this should provide quite a powerful additional incentive to resist wage demands or other similar cost increases. A 5% increase in costs, for example, followed by a 5% increase in prices, would mean a loss of about 20% of profits after tax over and above any loss already sustained under the present system.

This loss, it must be admitted, would occur only in the first year following the price increase. For the proposed tax depends on the annual *change* in prices, and not on the *level* of prices. Hence, whereas the $x - 1\%$ loss is a permanent one, occurring in every year succeeding the price change, the 4% loss only occurs in one year. One could, if it seemed necessary, modify the tax so as to increase (or reduce) the rate for several years following a price increase (or decrease), instead of for only one. In the extreme case, where "several" became "an infinite number of," this would make the rate of profits tax depend on the *level* of any firm's prices. While this would greatly increase the effect of the tax for those firms subject to it, it would probably lead to many more firms opting out of the system. For it could not pay any firm with an upward trend in its prices to remain in. Moreover, firms with a downward trend in their prices would eventually exhaust all possible tax benefits, and so would cease to have a tax incentive to make further price cuts.

Instead of strengthening the tax incentive in this way, one could raise the "gearing," that is, the number of percentage points change in the rate of tax for each percentage point change in prices (the "gearing" is two in the table on p. 353). There are disadvantages in a high gearing, however, which are discussed in the next section. There are, therefore, limits to the degree of effectiveness of the tax. Nevertheless, where x is small, it seems to the writer that the additional incentive provided by the tax could make an important difference to firms' attitudes to collectively negotiated cost increases, and that this in turn could make a significant difference to the rate of increase of the price level. It would seem difficult to deny this conclusion while simultaneously upholding the importance of cost inflation.

It should be apparent by now why the proposed tax system would *not* much affect firms' individual price and output policies. For the individual members of our group the relevant elasticity of demand must be fairly high, at least in the long-run. Hence there already exists a strong incentive to resist cost increases which are specific to the individual firm. If costs or prices are changed the level of profits in all future years is affected, whereas under the system proposed it is only profits tax in the year immediately after the price change which is affected. Hence, in deciding what output to produce, what price to charge and how stiff a resistance it is worth making to cost increases which are specific to itself, the most important considerations for the firm are the effects on its profits *before* tax, and these will generally outweigh the changes in its profits after tax resulting from the proposed system.

Thus far we have considered only one type of market situation, that of the large group of producers in imperfect competition with each other. If our conclusions are to have any weight they must be shown to apply in other situations besides. In what follows we shall try to show that they do apply in situations of oligopoly with a kinked demand curve, with price leadership or with a price agreement, and also in certain circumstances where there is a large monopoly. There must be a large sector of the economy which can be typified by one or other of these market situations and to which our conclusions therefore apply.

The kinked demand curve has been used to analyse the behaviour of an oligopolist competing in a situation in which there is no formal price agreement nor a recognised price leader. The kink in the (subjective) demand curve at the existing price is due to the assumption by the oligopolist that any increase in price would not be followed by his competitors, while a cut would. Hence there is a wide range of marginal costs which would equal marginal revenue at the existing price, so that there is generally little temptation to change the latter. The proposed tax would not greatly alter this situation so far as the actions of the individual ologopolist *vis-à-vis* his competitors were concerned. There would be rather stronger reasons for not raising prices, and the reasons for not cutting them would be slightly weakened, but, because a change in price would generally still make a big difference to profits, and because this difference would apply in all subsequent years, whereas the difference in tax payments would apply only in the first year, the tax would probably cause no individual change in price or output to be made. The collective attitude to wage negotiations would, however, be altered. A group of oligopolists is likely to behave rather like the large group so far as these are concerned. If costs increase for reasons which are common to all the members of the group, prices will be raised all round—the position of the kink will shift. If profit margins are kept roughly constant in the face of such a change in costs, then the previous analysis applies, and this may be the usual case.

Prices and profit margins might, however, be lower than those which would maximise the (long-run) profits of the group. This might happen through historical accident and the force of convention: the "normal" level of prices in relation to costs might simply have become established at a level sufficient to yield reasonable but not maximum profits, even allowing for potential competition from other producers. Or profits and margins might be kept low for fear of criticism by the Monopolies Commission or threats of nationalisation. In these circumstances the oligopolists could offset the effects of the proposed tax on their profits after tax by raising prices more than proportionately to the increase in costs. The incentive provided by the tax to resist cost increases would then, it seems, be blunted.

There would, however, be various resistances to such an increase in profit margins. Established conventions might have to be broken, there

might be greater risks of investigation by the Monopolies Commission or of nationalisation. Furthermore, since one could never be certain just what level of prices would maximise profits in the long run, and since the higher the level of prices, the greater the danger of competition from outside the group, there might be some members of the group who would be particularly reluctant to raise profit margins. They might prefer to put up more resistance to cost increases, and the other members might be forced to go along with them, for if a few members of the group refused to raise their prices by more than a certain amount the others (if the products were reasonably homogeneous) would have to follow suit. Hence, even in the circumstances supposed, the proposed tax could make a significant difference to firms' attitudes to cost increases.

A similar analysis may be made of the situation in which there is a recognised price leader, or where there is a price agreement. If profit margins are not altered when costs go up for the whole group, then the position is essentially the same as the large group case. If there is scope for an increase in margins, then there will nevertheless be resistance to increasing them and differences of view as to whether they should be increased, with the most cautious members of the group tending to have the deciding voice. The large monopolist will be affected similarly. He may be rather more sensitive to the Monopolies Commission, to nationalisation threats and to public opinion generally, and hence more reluctant to increase margins on this account; on the other hand, there would presumably be no possibility of profit margins being kept down to the level dictated by the most cautious part of the monopoly. But his attitude to cost increases should be changed, just as would the attitudes of the firms in the market situations mentioned earlier on.

Hence we may conclude that the proposed tax would probably make a significant difference to the rate of increase in prices due to cost inflation (or the rate of increase occurring at any given level of employment). In economies where cost inflation is unimportant the tax would probably have little effect on the general level of prices. Nor would it much affect an individual firm's price and output policies. But it should help appreciably in securing price stability in the United Kingdom. We turn now to a very brief consideration of some other economic effects of the tax.

The substitution of the existing profits tax by the proposed tax varying with price changes would make it relatively more profitable to produce those kinds of goods whose costs tend to fall through time, and less profitable to produce those kinds of goods whose costs tend to rise through time. It would thus tend to increase the supply of the former and reduce the supply of the latter. If we regard the existing allocation of resources as an optimum, the introduction of the tax must lead to a misallocation. This is usually true of any tax, but taxes are still levied. On the one hand, the tax may be considered the least damaging way of achieving some desired end (usually,

the raising of revenue or curbing of demand, but in this case the reduction of the rate of increase in prices). On the other hand, one may doubt whether the pre-tax situation really is an optimum, or would be much worsened by the tax. It is not always easy to foretell which products are going to be subject to falling costs of production and which to rising costs, or how much costs are going to change. Most cost changes depend on changes in techniques, which cannot often be easily foreseen. For these reasons the effect of the tax on the relative supplies of the two types of goods might not be very great, and, in so far as there was some effect, might not be very damaging.

The new tax might be a rather better contra-cyclical weapon than the existing profits tax. Since profits tend to rise in a boom and fall in a slump, profits tax, levied at a constant rate, yields more in a boom and less in a slump. It acts as a "built-in stabiliser." The proposed profits tax would vary even more as between boom and slump, since prices tend to rise in the former and fall (or rise less) in the latter.

V. Some Objections to the Proposed Tax

An objection which might be made to the proposed tax is that, even if it did help to secure price stability, it would do so only at the cost of industrial strife. Firms' resistance to wage increases might be stiffened, but this must imply a greater readiness to allow strikes to occur, and it would be only because of this that the pace of wage increases would be reduced. This might be true initially, but not once the habit of smaller wage increases had been acquired. There would not be, after all, any reduction in the rate of increase of *real* wages. Even initially there might not have to be many strikes. Many trade-union leaders are probably well aware of the futility of securing increases in money wages which are largely offset by subsequent increases in the cost of living. If they could be sure that a smaller wage increase for their members was not going to be out of line with those secured by other unions, and if they could produce reasons which would convince their own members on this point, they might well be satisfied with the smaller increase. It would be generally realised that firms were prepared to put up a stiffer resistance to wage demands, and, if the tax was accompanied by some skilful publicity, cost inflation might die a relatively painless death.

A second objection which might be made to the proposed tax is that it would not be fair. If a firm's costs rise, because, for example, of a rise in the prices of its materials which are produced by other firms, and over which it has no control, it may be forced to raise its selling prices in order to make any profits at all. Yet this firm must then pay profits tax at a higher rate than some other firms more fortunately placed.

It may as well be admitted at once that there is an element of unfairness in the tax and that this is one reason why it should not be very highly geared. But it will be argued, first, that this element is unlikely to be very serious and, second, that most taxes are unfair anyway.

The provisions for opting out ensure that there is an upper limit to the tax payable by any firm. Furthermore, if the tax is based on the annual change in prices, a once-and-for-all rise in material prices will lead to a heavier tax liability only in the first year of the price increase. Since many increases in prices of materials are followed by decreases, the initial tax penalty will be followed by a compensatory tax benefit.[1] It is only where material and other costs outside the firm's control have a persistent upward trend that the tax will seriously discriminate against the firm. But even here it would be a mistake to suppose that the firm will bear the whole burden of the tax. One would normally expect that profits before tax would tend to become somewhat greater for firms of this kind, so that some of the burden would be shifted on to the buyer of the firm's products.

It is hard to see why the proposed tax should be considered any more unfair than many other taxes. Purchase tax, for instance, makes the production of the goods taxed less profitable than it would otherwise have been. The same is true of the tobacco duty, the duties on alcoholic drinks and the duty on petrol. Even income tax and surtax are regarded as being unfair, or at least containing unfair elements, by some.

In at least one respect the proposed tax makes for greater fairness. It discriminates in favour of those firms which do show restraint in putting up their prices and profits. Assuming that action of this kind is in the social interest, it would seem just that it should be rewarded by society.

To sum up. The crucial point is whether the element of unfairness in the proposed tax constitutes a strong argument against it. In view of the above considerations and of the alternative methods of reducing the rate of price increase available, which involve plenty of unfairness as well as other disadvantages, the writer concludes that it does not.

A third, and serious, objection to the proposed tax is the difficulty of measuring price changes. It is true that the basic data of quantities sold and amounts paid for them must form a part of any firm's business accounts. But how can one allow for quality changes? For new products? For sales for which there are no easily identifiable quantities (*e.g.*, maintenance work)?

Before taking up these points, let us consider what form of return would be required from each firm. Basically, this should consist of a list of items sold in the year in question (call this year 1), together with the following information for each item; quantity sold in year 1, amount received for this quantity in year 1, quantity sold in the previous year (call this year 0),

[1] The tax might tend to stabilise profits, since there are usually inventory gains in periods of rising material prices and inventory losses when material prices fall.

amount received for this quantity in year 0. From this return the firm could calculate a price index of the Paasche form:

$$\frac{\Sigma (p_1 q_1)}{\Sigma (p_0 q_1)}$$

In this index the price relatives are weighted in accordance with the values of the goods sold in year 1, and only goods sold in year 1 feature in the index.

It would probably be unnecessary to make *very* detailed returns. So long as the products grouped together as one item were approximately alike, this would be sufficient. The returns would thus be similar to, though probably rather more detailed than, those already made annually by many firms for the censuses of production. It would be up to the firm in the first place to decide how detailed its list should be, and what adjustments should be made to the recorded quantities to allow for quality changes. Where a product was sold for the first time in any year, or where the quantities sold in year 0 were so small as to make the price unrepresentative, the firm could use prices charged by other firms for similar products in year 0, assuming such data to be available. It could obtain the help of the Inland Revenue in getting this data. If such data were not available, or if the nature of the product made it virtually impossible to measure the quantity sold, then the sales of such products would have to be excluded from the calculation. But if the exclusions amounted to more than, say, 10% of all sales, the firm could be assessed for tax as if it had opted out.

The Revenue might, of course, wish to challenge some of the firm's estimates, and it would be necessary to devise a suitable system of appeals to decide disputes which the two parties could not settle between themselves. To provide an incentive for such settlement, and to avoid small amounts being considered by the appeals tribunals, the appeals would need to be made suitably costly to both parties.[1]

Now one can hardly expect an appeals tribunal to decide exactly what adjustments should be made for quality changes. But it should be able to decide whether a given estimate was on the high side or on the low side, without saying by how much. Let us suppose, for example, that the firm claims that the quantity sold of a particular product has increased by $F\%$, after adjustment for quality changes, between year 0 and year 1. Suppose the Revenue claims that the true increase is not so big, say $R\%$. Then, if the tribunal decided the increase was $F\%$ *or bigger*, the firm's estimate would stand, while if it decided that the increase was $R\%$ *or smaller*, the Revenue's estimate would stand. This would prevent the firm exaggerating the increase in quantity in its original return, and it would also prevent the

[1] The number of appeals could also be reduced by making the tax brackets larger, since there would be little point in appealing unless the difference between the two parties was sufficient to take the firm out of one tax bracket and into another. On the other hand, very large tax brackets might reduce the incentive to stop prices rising.

Revenue unduly minimising the increase in its submission to the tribunal. If the tribunal thought the true increase lay between R and F it could choose whatever it thought to be an appropriate figure between them.

It would be tedious to examine all the possible sources of dispute between firms and the Revenue, but it is hoped that the above example shows that it should not be impossible to devise a satisfactory system for settling them, and that the problem of measuring price changes is by no means insuperable. After all, the conceptual difficulties of measuring income are at least as difficult as those of measuring price, and yet a procedure which works in practice has been found.

A fourth objection, which follows naturally from the one just considered, is that the cost of administering the tax would be unduly heavy. Estimates of this cost must be left to the experts, but the following considerations are relevant. The basic information of quantities and values of sales should be available from invoices. The firms' returns, as has already been pointed out, would be similar to those already made for the censuses of production, and could replace them. The additional detail becoming available in this way would have other uses besides forming the basis of the assessment for profits tax. The administrative problems would probably be most severe in the years immediately following the introduction of the tax, and its application might be confined initially to the larger companies. Companies below a certain size would continue to pay tax on the present basis. This might not much affect the economic impact of the tax. Finally, if the tax were effective in slowing down the rate of increase in prices it would be worth incurring a fairly heavy administrative cost. The economic loss involved might be much smaller than that produced by deflation, for example.

A fifth objection is that the tax would not merely give an incentive to reduce prices but also to reduce quality. Firms could avoid putting up prices by allowing the quality of their products to deteriorate, and they would pay less profits tax if they did so. It has already been argued that the individual firm's price and output policy would not be greatly affected by the tax.[1] The normal forces of competition, which encourage firms to improve quality for a given price, and penalise them if they worsen it without adequately cheapening their products, would continue to operate much as at present. It is true that firms might *collectively* agree to reduce the quality of their products, but such an agreement might be difficult to enforce, and the individual interests of the parties to it would be opposed to it. In any case, it is possible that the present system puts too high a premium on quality. Price agreements and resale price maintenance both tend to divert competitive energy into the improvement of quality rather than the lowering of price, and if the tax were to redress the balance a little it might be no bad thing. Finally, gross deteriorations in quality would be detected by the

[1] See p. 358.

Inland Revenue, and firms would be unable to obtain any tax advantage from them.

A sixth objection to the proposed tax is that it would be possible to get the benefit of lower tax rates without really cutting prices by means of sales to subsidiaries or to other firms in the same ownership. Firm A might lower its prices to firm B, thus reducing A's profits tax, while B kept its prices unchanged. If A owned B, or B owned A, or if both were owned by a third firm, there would be a net gain from the whole operation. This is not a very serious objection, since the operation would lead only to a once-and-for-all saving in tax, assuming the tax to be based on annual changes in prices. If A made the same price reduction in successive years the tax saved would get smaller and smaller, for the weight of sales to B in A's total sales would decline [1] and also A's profits would diminish, so that there would be less to be gained by any given reduction in the rate of tax.[2] Most of the once-and-for-all saving in tax could be prevented by ruling that sales made at prices which were clearly not based on normal commercial considerations could be omitted from the calculation of average price by the Revenue. A more drastic procedure, which would probably be unnecessary, would be to exclude all sales to firms which had a common ownership with the firm in question.

Some might think it necessary to exclude exports from the calculation of average price, but this is by no means certain. In certain circumstances it may be desirable that firms should charge lower export prices than they would on a strict consideration of maximum profitability. If exports were to be excluded, the exclusion should be optional on the part of the firm, since otherwise firms exporting products whose costs tended to fall through time would be at a disadvantage compared with those selling the same products on the home market. The best method of dealing with exports would have to be decided in the light of foreign countries' views, since we are committed to avoiding export subsidies. It seems unlikely, however, that foreign countries would object to the exemption of exports, since this would remove an incentive to cut export prices. Nor could they reasonably object to the inclusion of exports, since this would involve no *discriminatory* treatment of them.

VI. Conclusion

It is for the reader to decide whether or not a *prima facie* case has been made for a tax on price increases. Before such a tax were imposed, many

[1] Unless the whole of A's sales went to B. But in that case A's profits would soon disappear (but see next footnote).

[2] Under the present tax system, parent firms can, if they choose, merge their profits with those of their subsidiaries for profits-tax purposes. If A and B's profits were merged in this way they might still secure some tax advantage from a fall in the prices of A's sales to B, even though A's profits were zero or negative. In this case the limiting factor to the tax advantage which could be secured would be the falling weight of A's sales to B in the total sales of A and B combined.

important points would have to be settled, and the combined wisdom of Inland Revenue officials, accountants, lawyers, business-men and others would be needed to determine its exact form. It might be different in many important respects from the tax described here, for the writer is well aware that he is almost certainly blind to many of the snags and repercussions of this proposal. The question is, is it worth while setting all these men to work? The problem of slowing down the increase in prices has proved so intractable since the War, and our methods of tackling it have been so costly, that some better solution is badly needed. The writer hopes that the proposal may contribute towards such a solution.

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INCOME AND INVESTMENT IN THE UNITED KINGDOM, 1856–1914

THE purpose of this article is to make available two new series of historical statistics: the first of domestic fixed capital formation, the second of net national income. Both series relate to the United Kingdom and span the period 1856–1914.

They are presented here without comment, and with only the most summary indication of the methods used. A more complete account, with detailed tables, will appear later in a monograph to be published by the Department of Applied Economics, Cambridge.

I. DOMESTIC FIXED CAPITAL FORMATION

1. *Introduction*

There are three main ways in which it is now possible to improve the existing estimates of pre-1914 fixed investment.

The first, and most important, is the basic method used. What is probably the best of the previous estimates [1] was made by grossing-up annual series for four of the main components of total investment in proportion to their share in the total (80 : 150) in 1907. The major defect of this method is its inability to allow for changes (both cyclical and long-term) in the composition of investment.

The alternative method, used in the present estimates, is to make estimates for each component, so that for each year the whole of the total is covered by an explicit estimate. It is, of course, not possible to obtain reliable annual series for many of these additional components, particularly for the earlier years. It is believed, however, that even very approximate annual indications of the movement and level of these components result in a more accurate total than that obtained by the grossing-up method.[2]

Secondly, it is possible to revise the estimates for three of the four main components used by Jefferys and Walters: residential building, shipbuilding and railways.

Thirdly, the starting point of the estimate has been pushed back to 1856 although the pre-1870 figures are much less reliable.

It must be emphasised, however, that even with such improvements as may have been made, no great accuracy is claimed for the present estimates for years so far in the past and concepts for which no adequate basic statistics were kept.

[1] J. B. Jefferys and D. Walters, "National Income and Expenditure of the United Kingdom, 1870–1952," *Income and Wealth*, Series V, (1955).

[2] This point is further considered in section 4 below, where the two results are compared.

The conceptual problems involved in the measurement of capital formation have been widely discussed in recent years. The basis of the present estimates is very largely dictated by the nature of the data available, and it is not proposed to consider the conceptual aspects here.

The relationship between the concepts used is indicated in the following paragraph. The most important point to notice is that gross capital formation is taken net of all work on alterations and maintenance.

2. *The Base Year, 1907*

The one firm point for all estimates of pre-1914 capital formation is the 1907 Census of Production.[1] Several analyses of the census have been made with a view to obtaining an estimate of the output of capital goods in 1907. The most thorough of these is undoubtedly that made by Professor Cairncross,[2] and his results have been adopted as the starting-point for the present estimates. His estimate can be set out as follows:

	£ million.
Gross output of capital goods, less net exports	275
Less Repairs and maintenance, etc.	125
=Gross fixed capital formation	150
Less Depreciation (renewals)	50
=Net fixed capital formation	100

These are the pivots on which the corresponding annual series turn.

Cairncross provides a table [3] showing the detailed breakdown of new construction and repairs into their main components. For our purpose the components of the former have to be re-allocated into the categories for which we can make annual estimates. In most cases, including all the large

TABLE I

Gross Domestic Fixed Capital Formation, 1907

	£ million.
Residential building	28·0
Shipbuilding	18·5
Railway companies' capital expenditure	15·0
Local authorities' capital expenditure	23·6
General engineering	24·4
Shops, warehouses, offices, factories, etc.	8·0
Electrical engineering	6·5
Telegraphs and telephones	3·3
Structural work to buildings and bridges	5·6
Miscellaneous items, fittings, installations, etc.	17·1
	£150·0

[1] Final Report on the First Census of Production of the United Kingdom, Parliamentary Papers 1912–13, Vol. CIX.

[2] A. K. Cairncross, *Home and Foreign Investment, 1870–1913* (1953), pp. 103–24.

[3] *Ibid.*, p. 123.

items such as ships or dwellings, there was a reasonably clear basis for this allocation. In other cases it was necessary to make somewhat arbitrary judgments. The items concerned are, however, too small for the net error thus introduced (*i.e.*, by using the "wrong" indicator to extrapolate the base year value) to be significant. The result is shown in Table I.

In the following sections we outline the methods used to obtain annual series for each of these categories. For two of the components—the capital outlays by railway companies and local authorities—the estimates were made from the expenditure side. For the remainder the estimates were made by extrapolating the 1907 value by means of indices of volume and price.

3.1. *Residential Building*

B. Weber[1] has estimated the number of houses built in Great Britain in each year since 1856. For a cost series we have the index of building costs constructed by K. Maywald.[2] Both these series are probably more satisfactory than the corresponding series used earlier by Cairncross[3] to construct the estimate taken over by Jefferys and Walters.

In order to allow for the increasing size of houses, more elaborate finishing and so on, we adopted Cairncross' practice of using an index showing an increase of ½% per annum.

The annual value series was then obtained by extrapolating the 1907 value by means of these three indices.

3.2. *Shipbuilding*

The volume series here is the net tonnage of steam and sailing vessels completed, as shown by an official return.[4]

The index of selling prices used by Cairncross was a makeshift one based mainly on isolated and possibly unrepresentative builders' quotations. In its place we have used the index of construction costs compiled, after extensive inquiries, by Maywald.[5] It is built up from the supply side, and the costs of machinery and of hulls are estimated separately. It is important to note that by an ingenious though complicated process allowance is made in the index for the effect of both improvements in shipbuilding design and construction, and changes in the materials used to build a unit of registered tonnage.

The annual value series combines two estimates: for steam vessels the net tonnage completed was multiplied by the index of the combined cost of

[1] B. Weber, "A New Index of Residential Construction, 1838–1950," *Scottish Journal of Political Economy*, Vol. II, 1955.

[2] K. Maywald, "An Index of Building Costs in the United Kingdom, 1845–1930," *Economic History Review*, Vol. VII, 1954–55.

[3] Cairncross, pp. 145–58.

[4] Board of Trade, *Annual Statement of the Navigation and Shipping of the United Kingdom.*

[5] K. Maywald, "The Construction Costs and the Value of the British Merchant Fleet, 1850–1938," *Scottish Journal of Political Economy*, Vol. III, 1956.

hulls and machinery; for sailing vessels the net tonnage was multiplied by the index of the cost of hulls only.[1] The base year value for these two series was obtained by splitting the 1907 figure (£18·5 million) between steam and sailing vessels in the proportion suggested by Maywald's estimates of actual values in the base period.

The general level of the resulting series agrees well with that of the corrected estimate by Cairncross, although the amplitude of the fluctuations is less marked in the present series, particularly at the peaks of 1900 and 1913. This is very largely due to the fact that, as Cairncross noted,[2] his price index "fluctuates rather too violently." The quoted prices are probably unduly influenced by fluctuations in freight rates, and it seems likely that Maywald's cost index is a better guide to realised prices.

3.3. *Capital Expenditure by Railway Companies*

The present series covers all capital expenditure by the railways, including the expenditure on items such as ships, harbours and canals. It also includes the capital outlays on the Manchester Ship Canal and the London undergound railways.

From 1856 to 1872 the estimate was taken as the annual net addition to the cumulative figures of capital expenditure on railways open for traffic, assembled by *Herepath's Railway Magazine*.[3] From 1873 to 1915 the estimate was obtained from the annual net additions to the total capital expenditure of some fifty railway companies, published in various railway journals. Rough adjustments were made for purchases of existing railway companies and for nominal additions to the capital.

Our estimate for the period 1870–1913 (£631 million) is broadly confirmed by a comparison with the increase in paid-up capital (excluding nominal additions) over the same period (£618 million), and the increase of £661 million from *Herepath's* figure for the accumulated expenditure at the end of 1869 to the accumulated expenditure of £1,157 million shown in the 1913 *Railway Returns*.[4]

3.4. *Loan Expenditure by Local Authorities*

For 1870–1914 we have taken Cairncross'[5] figures of loan expenditure (or, in the earlier years, receipts from loans) extracted from the *Annual Local Taxation Returns*, or *U.K. Statistical Abstracts*. The figures are not adjusted to calendar years.

It is more difficult to obtain estimates for the period 1856–69. For

[1] I am greatly indebted to Dr. Maywald for suggesting this procedure to me as being the most suitable way in which to use his indices of shipbuilding costs.

[2] Cairncross, p. 126.

[3] *Herepath's*, January 6, 1873.

[4] *Railway Returns, 1913*, PP. 1914–16, Vol. LX.

[5] Cairncross, pp. 142–3.

1867/68 there is an estimate of receipts from loans of £6·0 million made for Goschen's *Report on Local Taxation*.[1] For other years most of the components of this total cannot be traced, and the estimate for this period is extremely rough. It is based on such returns as are available, scaled up roughly in proportion to the amounts shown in 1867/68.

3.5. *General Engineering*

For this series it has not proved possible to find a more reliable annual series than the crude index of "machinery" retained for home use calculated for 1870–1914 by Cairncross.[2] The reservations which must be attached to this series do not need emphasis, and it must be remembered that the contours of the series may be appreciably influenced by the non-exclusion of steel rails, structural steel used by railway companies and local authorities and so on.

For 1856–69 capital expenditure on machinery was assumed to be the same proportion of residential building, shipbuilding and capital expenditure by railways and local authorities as it was, on average, over the decade 1870–79. This assumption probably overstates expenditure around 1866 by exaggerating the effect of the railway boom.

3.6. *Shops, Warehouses, Offices, Factories, etc.*

A very approximate indication of the value of non-residential building may be derived from the Inhabited House Duty statistics.[3] The significant relevant categories are Residential Shops, and Premises not used as Dwellings. Both numbers and gross annual values are given, and the latter were used because of the wide disparity between the individual units.

The annual increase in the gross annual value was roughly corrected for the effect of the periodic re-assessments (working separately with the figures for the Metropolis, the rest of England and Wales, and Scotland), for certain changes in the operation of the Act and for known irregularities in the official statistics.

A very rough correction for the fact that the series was obtained from annual values was then made by deflating the adjusted increments by an index of rents.[4] The resulting estimate of the annual volume of non-residential building was multiplied by Maywald's index of building costs and used to extrapolate the 1907 base-year value of £8·0 million.

The necessary Inhabited House Duty statistics only begin in 1874/75. For 1856–73 non-residential building was assumed to be the same proportion of residential building as it was, on average, from 1875 to 1884.

[1] PP. 1870, Vol LV. Appendix, Table III, p. 227.
[2] Cairncross, pp. 158–67.
[3] *Annual Reports of the Commissioners of Inland Revenue.*
[4] Given by Cairncross, p. 213.

3.7. *Electrical Engineering*

A number of series are available which might be taken as an approximate indication of the annual expenditure on electrical machinery. The series chosen is based on the figure given annually in *The Electrician* from 1890 to 1913 for the total "connections," public and private, to public electrical supply mains. It is necessary to assume that the private supply moved in the same way as the public supply, but the series may not be too bad as a crude indication of the growth in the use of electrical machinery.

The annual increase in total "connections" was used as an index to extrapolate the 1907 value of £6·5 million. No correction was made for price changes. The value obtained for 1890 was £0·1 million, and this amount was taken for each year back to 1884.

3.8. *Telegraphs and Telephones*

An index of capital expenditure was built up from two sources. The first was an official return[1] showing how the capital raised under the Telegraph Acts of 1882–1913, including the Telephone Transfer Act of 1911, had been expended. Payments for the purchase of the National Telephone Company's assets were excluded.

The second was the capital expenditure of the National Telephone Company until it was taken over by the Post Office in January 1912. From 1885 to 1904 this was taken as equal to the annual increase in the capital of the Company.[2] From 1905 to 1911 a figure for the Company's capital expenditure on exchanges and lines was derived from *Garcke's Manual of Electrical Undertakings*.

These two series were combined and used as an index to extrapolate the 1907 value of £3·3 million. The cumulated total of the resulting series over the period 1885–1914 is £41 million, which agrees well with the £40·1 million for the value of plant at prime cost, as shown in the *Post Office Accounts* at March 31, 1915.

3.9. *Structural Work to Buildings and Bridges*

The amount of £5·6 million for 1907 covers all such structural work not done by the railway companies. The annual figure for this item was assumed to be the same proportion of total building as it was in 1907 (5·6 : 36).

3.10. *Miscellaneous Items, Fittings and Installation*

The amount of £17·1 million shown under this heading in Table I is largely composed of small items for which no appropriate individual indicators exist, but which might reasonably be assumed to move with total investment.

[1] Post Office Telegraphs and Telephones. *Accounts* for the year ended March 31, 1915. PP. 1914–16, Vol. XXXVIII.

[2] *Select Committee on the Post Office (Telephone Agreement) 1905.* PP. 1905, Vol. VII, Appendix No. 2, p. 413; and No. 9, p. 425.

An annual addition was therefore made to the total of all other items in the ratio of 17·1 to 132·9.

4. *Total Gross Fixed Capital Formation*

The ten individual series described above are brought together in column (1) of Table II to give the annual estimate of total gross investment in fixed capital from 1856 to 1914.

It is not possible to undertake a detailed comparison in this article with the Jefferys and Walters' estimate, but it may be noted that the present estimates are significantly lower, despite the common base of £150 million in 1907. Taking separately the four components for which they have explicit estimates, and the remaining six for which they obtain a total by grossing-up the four, it is found that our estimates for the four (sections 3.1 to 3.4 above) are higher than theirs, while our estimates for the six components (sections 3.5 to 3.10 above) are generally substantially lower. For these six, the difference averages £10 million per year in each quinquennia of the 'seventies, £20 million per year in 1880–84, and £12 million per year in each of the three quinquennia from 1885 to 1899. In 1910–13, however, their estimate for the six components is £5 million per annum higher than ours.

These substantial differences can be explained by a few illustrations. If we take, for example, the series for electrical engineering and telegraphs and telephones they would be (implicitly) included in the grossed-up estimate for the 'seventies at £7 million per year. Our direct estimate shows, more plausibly, that expenditure on these components had not yet begun in this period. Or, to take the converse case, 1910–13, the grossed-up estimate is unduly depressed by the assumption that it moved in step with the four components, three of which (house building, railways and local authories) were at a very low level in this period. There is, however, much independent evidence to show that in these immediate pre-war years the state of industrial activity (and shipbuilding) was much more prosperous than that of the building and contracting industries. The present direct estimates for general and electrical engineering, etc., thus again appears to be more acceptable than the implicit estimates.

Our conclusion was, therefore, that even a poor explicit series was likely to give a more accurate indication of the average annual level of investment than an implicit estimate obtained by grossing-up other series by a constant factor.

5. *Net Domestic Fixed Capital Formation*

Depreciation in 1907 was estimated as £50 million (see section 2 above). We extrapolated this amount by an index of depreciation.[1] The index rests

[1] This method of constructing an index of depreciation was first suggested by E. H. Phelps Brown and S. J. Handfield Jones, "The Climacteric of the 1890's," *Oxford Economic Papers*, Vol. IV, 1952, p. 303.

on the assumptions that the trend of depreciation was that of national income, but that the annual rate of depreciation varied about that trend proportionately to the variations of gross investment about its trend. The annual percentage deviation of gross investment from its trend (nine-year moving average) was applied to the trend of national income and the resulting series used as the index of depreciation. The index is inevitably very approximate.

The series for net investment is given in column (3) of Table II.

TABLE II

U.K. Domestic Fixed Capital Formation, 1856–1914

(£ million)

	Gross.		Net.			Gross.		Net.	
	At current prices.	At 1900 prices.	At current prices.	At 1900 prices.		At current prices.	At 1900 prices.	At current prices.	At 1900 prices.
	(1)	(2)	(3)	(4)		(1)	(2)	(3)	(4)
1856	44	53	28	33	1885	79	92	40	57
1857	42	46	27	30	1886	66	79	39	46
1858	42	48	28	32	1887	65	78	39	47
1859	39	45	25	29	1888	72	85	45	51
					1889	82	93	48	54
1860	43	49	27	31					
1861	50	58	33	39	1890	86	95	50	55
1862	61	72	41	49	1891	91	104	52	59
1863	68	75	46	51	1892	98	116	58	69
1864	79	83	54	57	1893	91	109	56	67
					1894	96	117	61	74
1865	82	90	56	61					
1866	89	98	61	68	1895	93	113	62	77
1867	66	74	45	50	1896	105	128	72	88
1868	57	62	39	43	1897	131	156	91	108
1869	56	59	38	40	1898	156	178	111	127
					1899	173	187	125	135
1870	74	82	51	56					
1871	86	94	59	64	1900	190	190	141	141
1872	88	94	68	65	1901	191	198	142	148
1873	96	88	68	59	1902	196	212	146	158
1874	110	95	80	70	1903	192	210	141	154
					1904	185	202	134	147
1875	114	111	83	81					
1876	121	124	88	90	1905	173	190	125	136
1877	120	125	87	91	1906	164	178	113	122
1878	106	115	75	80	1907	150	158	100	105
1879	91	102	65	72	1908	120	129	77	83
					1909	121	131	75	81
1880	94	99	67	70					
1881	91	97	63	68	1910	124	132	81	86
1882	95	99	64	66	1911	120	129	78	84
1883	98	102	64	68	1912	129	128	84	84
1884	88	100	57	64	1913	157	150	105	100
					1914	151	145	101	97

6. *Investment at Constant Prices*

Series for gross and net fixed investment at constant (1900) prices are given in Table II. The series for gross investment was obtained by deflating each of the ten component series by its appropriate price index.[1]

[1] For the two estimates from the expenditure side—railways and local authorities—the price index used was Maywald's index of the cost of "other construction." K. Maywald, *Economic History Review*, Vol. VII, 1954–55, p. 193.

The implicit weighted index given by the series for total gross investment at current and 1900 prices was then used to deflate the estimate of total net investment at current prices.

II. Net National Income

In this section we present the results of a revision and extension of the estimates of the pre-1914 national income of the United Kingdom, published in 1948 by Dr. A. R. Prest.[1] The accuracy of several of the component series (in particular, the agricultural incomes and the profits assessed to tax under Schedule D) has been improved; and the estimates are carried back to 1855.

The total is the sum of three categories of income: incomes subject to tax (including agricultural profits), incomes paid to wage-earners and intermediate incomes, *i.e.*, those not covered by either of the two other categories.

7. *Incomes Subject to Tax*

The basis for our estimate of these incomes was specially constructed estimates of taxable income [2] under each schedule, adjusted so as to be fully comparable year by year despite all changes in the administration of the tax system. All previous estimates of national income have been based on Lord Stamp's "comparative series" of taxable income,[3] which was available only for the five schedules in total. The construction of series for the individual schedules has permitted several major improvements in the estimates.

It is not possible to describe here the methods used to obtain these five series. They involved many hundreds of small, complicated, technical adjustments to the figures for each year of either the net income on which tax was received under each schedule or the net produce of the tax under each schedule. The final control on these estimates was that the five separate series should sum to Stamp's total.

The subsequent estimates have to take into account two assumptions which were required to obtain the comparability of the taxable income series over the whole period. The first was that the limit below which incomes were exempt from tax was £160 throughout. The second was that the standard allowances for wear and tear of machinery and for repairs to land and houses were granted throughout.

The estimate of income subject to tax was then built up from these five series.

[1] A. R. Prest, "National Income of the United Kingdom, 1870–1946," Economic Journal, Vol. LVIII, 1948. The present estimates have benefited greatly from the generous help of Dr. Prest, who kindly put at my disposal the working papers for his article.

[2] For the relationship between taxable income and the data given by the tax statistics see J. C. Stamp, *British Incomes and Property* (1916), Chapter VIII.

[3] Stamp, pp. 318–19.

8. *Schedules A, C and E*

For Schedule A a small addition was made to the taxable income for deficiencies in the early valuations; [1] a correction was made for the effect of the periodic reassessment years; [2] and the adjusted series was then converted from a fiscal- to a calendar-year basis.

The adjustments required for Schedule C were the exclusion of interest on the National Debt and conversion to a calendar-year basis.

No adjustment was needed for Schedule E.[3]

9. *Schedule D*

For income assessed to tax under this schedule on the basis of (i) the profits of the current year, (ii) the profits of the preceding year, and (iii) a moving average of the profits of the five preceding years, no major problems arise, and we have, in general, followed the procedures suggested by Prest.[4]

It is the fourth and most important case, incomes assessed on the basis of a moving average of the profits of the three preceding years, which gives the most trouble. In order to unscramble this moving average [5] for the period 1854/55 to 1905/6 [6] we have used the ingenious procedure devised by Prest.[7] His cautionary remarks as to the limitations of this method should be borne in mind when using the annual series. After some experiment it appeared that the most satisfactory results could be obtained if the unscrambling was done separately for 1854/55 to 1875/76 and 1877/78 to 1905/6, interpolating for the missing year.

The final problem with the three-year moving average series is to determine the timing of the unscrambled series—to what year do the unscrambled figures correspond? At first sight it seems clear that the unscrambled figures corresponding to the moving average for, say, 1904/5 should be taken as the actual profits of the calendar year 1902,[8] *i.e.*, the unscrambled series should be set back two years.

If, however, we test the resulting profits series against a representative set of other indicators of cyclical fluctuations including unemployment, exports and bank clearings, the overall impression is that the turning-points in this profit series generally come one year too early.

[1] See Stamp, p. 38.

[2] See Prest, pp. 43–4, and Stamp, pp. 31–6.

[3] Stamp, p. 265.

[4] Prest, pp. 32–3 and 42–3.

[5] The actual series to be unscrambled cannot be obtained directly from the tax returns (cf. Prest, p. 37), and the series which we have taken differs slightly—due to a number of technical improvements—from that used by Prest.

[6] For the later years see section 10 below.

[7] Prest, pp. 33–6, and Appendix II, pp. 60–2.

[8] See, for example, Stamp, p. 177; and *Report of the Departmental Committee on Income Tax*, PP. 1905, Vol. XLIV, para. (85), and Appendices VI and VII, where the working of the three-year moving average is described in detail.

A comparison of this sort led Prest to argue that this must be due to some factor inherent in the tax system serving to advance the series. He suggested that there were three such factors, of which the most important was the "133rd Section," [1] and his unscrambled series was set back only one year. In fact, however, two of the factors, including the "133rd Section," could not have had *any* effect on the timing of the Schedule D assessments,[2] and the third factor is unlikely to have been significant.

It is not possible to elaborate this problem here. Despite lengthy and detailed investigations, we were unable to find any other factor inherent in the tax system which would provide a satisfactory explanation for these discrepancies between the fluctuations in profits and in other series.[3] There are a number of possible explanations, and while some of these may cast doubt on the suitability of tax assessments as a basis for estimates of the annual movement in trade profits,[4] they do not constitute sufficient warrant for a mechanical manipulation of the series which would bring it forward by one year, every year. We have, therefore, set the unscrambled series two years back, so that until 1903 all our turning-points occur one year earlier than those in Prest's series.

In view of the uncertainty on this score, it is essential that the annual series, and particularly the turning-points, should be regarded as tentative. This applies also to the final series of profits (see section 17) of which this series is a major component.

10. *The Unscrambled Schedule D Series, 1904–14*

The presence of a number of serious discontinuities in the Schedule D figures for 1900–14 makes it necessary to abandon the unscrambling procedure for this period. At this point, therefore, Prest simply hinged on to the unscrambled figure for 1903 a series derived from estimates given by Stamp [5] for the annual percentage change in profits. This procedure has two drawbacks: (i) any error in the 1903 figure is cumulated in all subsequent years; and (ii) to the extent that Stamp's percentages do not exactly correspond to the actual percentage changes (concealed in the

[1] The operation of these factors is explained in Prest, pp. 39–42.

[2] The adjustments under both the "133rd Section" and the clause enabling losses to be reported at once could be made only when the actual profit (or loss) for the year was known, which was not until after the original assessments were closed. The adjustments were therefore made by repayment of tax, not by changing the original gross assessments which we are unscrambling.

[3] I would like to acknowledge the very helpful correspondence on this problem which I have had with Mr. T. I. Williams, of the Statistics and Intelligence Department of the Board of Inland Revenue. In particular, the suggestion in the following footnote is due to him.

[4] It is possible, for example, that most sole traders and perhaps some partnerships would not have kept accounts and would make their returns and be assessed in round estimated figures. These estimates might well tend to be influenced as much by current trends as by a not so clear recollection of the course of trade in the three previous years. It is very difficult to know what weight to give to factors of this sort.

[5] Stamp, *The National Capital* (1937), p. 276.

movement of the moving average) annual figures will be obtained which deviate from the recorded tax assessments.

As a result, Prest obtained figures which by the end of the period are considerably in excess of the moving averages which they are intended to constitute. For 1914/15, for example, the assessed average of the three preceding years is £518 million, but Prest's unscrambled figures are: 1911, £562 million, 1912, £616 million, and 1913, £657 million.

We have, therefore, adopted a different procedure for obtaining the actual annual profits. For each year the annual percentage change given by Stamp can be related to the official Schedule D moving averages by a set of equations containing as the unknown variable the original (unscrambled) profit figure which we are trying to obtain. Since each unknown occurs in three consecutive moving averages, the effect of this procedure is that for each year we obtain three values for the unknown variable. If Stamp's annual percentage changes were exactly correct all three values would coincide. If they are incorrect the values will deviate to an extent determined by the size of the error in the annual percentages. The equations are explained in a footnote.[1]

[1] Let the unknown profits figures be

$$x_r, x_{r+1}, x_{r+2}, \ldots x_{r+n}$$

We are given the moving average of the three preceding years:

$$M_{r+2}, M_{r+3}, \ldots M_{r+n+2}$$

and also the annual percentage change in the unknown profits figure:

$$p_{r+1}, p_{r+2}, \ldots p_{r+n+1}$$

By definition we have the recurrence relations:

$$\begin{aligned} x_{r-2} + x_{r-1} + x_r &= 3M_{r+1} \\ x_{r-1} + x_r + x_{r+1} &= 3M_{r+2} \\ x_r + x_{r+1} + x_{r+2} &= 3M_{r+3} \end{aligned}$$

and so on. . . . . (1)

$$\begin{aligned} \frac{x_{r+1} - x_r}{x_r} &= p_{r+1} \\ \frac{x_{r+2} - x_{r+1}}{x_{r+1}} &= p_{r+2} \end{aligned}$$

and so on. . . . . (2)

From (2) we express x_{r-2} to x_{r+2} in terms of x_r. By substitution in (1) we then obtain the three values of x_r.

$$x_r = \frac{3M_{r+1}}{\frac{1}{(1+p_r)(1+p_{r-1})} + \frac{1}{(1+p_r)} + 1} \quad \ldots \quad (3a)$$

$$x_r = \frac{3M_{r+2}}{\frac{1}{(1+p_r)} + 1 + (1+p_{r+1})} \quad \ldots \quad (3b)$$

$$x_r = \frac{3M_{r+3}}{1 + (1+p_{r+1}) + (1+p_{r+1})(1+p_{r+2})} \quad \ldots \quad (3c)$$

for all r.

If the p_r we are given are correct (so that (2) is fulfilled) the three values will coincide.

From 1908 onwards the three values which we obtain for each year by this procedure are indeed very similar, and by taking their arithmetic mean we obtain a result which both complies with the official moving average and conforms closely to Stamp's annual percentages. For 1904–7 we have to manipulate the series slightly on account of discontinuities in the official series, such as the extensive changes introduced in the Finance Bill of 1907, which affect the unscrambled results for 1904, 1905 and 1906.

The revised estimates obtained in this way have the effect of reducing (by comparison with Prest) the Schedule D component of profits by an amount which increases from about £40 million in 1905 to £100 million in 1913. This is the most substantial of the differences between our estimates and those given originally by Dr. Prest.

11. *Agriculture Profits, 1867–1914*

Farming profits were assessed to Schedule B on the basis of a conventional proportion of gross rent. The resulting series bore no close relation to the level of actual profits and showed far greater stability than actual profits. Attempts have been made to allow for both these factors,[1] but they are open to a number of serious objections,[2] and it is probably not possible to obtain an accurate estimate of agricultural incomes from the Schedule B assessments.

Since we now have a separate estimate of the Schedule B taxable income, we can eliminate this series entirely and turn to some other source for our estimate of agricultual income. We are fortunate in having for this purpose a recent estimate of agricultural output since 1867 made by J. R. Bellerby and others, adjusted to give the net factor income from agriculture.[3] Bellerby has also made estimates of wages and of net rent[4] for the same period.

We have deducted Bellerby's estimates of wages and net rent from his

[1] See Prest, p. 45, and Jefferys and Walters, p. 24.

[2] For the most serious see the following footnote.

[3] J. R. Bellerby, *Agriculture and Industry: Relative Incomes* (1956), p. 56. The estimates of net factor income (and of wages) are there given only as annual averages for groups of years, and I am indebted to Mr. Bellerby for kindly providing me with the annual series on which his published data are based.

It may be noted that Bellerby's estimate of net income in 1911 is £141 million, compared with Bowley's estimate, based on the 1907 census, of £176 million (*The Division of the Product of Industry* (1919), p. 15; reprinted in A. L. Bowley and J. C. Stamp, *Three Studies on the National Income* (1938), p. 15). It appears that the difference is due mainly to the fact that Bowley misinterpreted the definition of output used in the *agricultural* census, and consequently made insufficient deduction for non-farm inputs. This is important for our purpose, because Jefferys and Walters followed Bowley in believing that it was necessary to add some £26 million to agricultural incomes, as derived from Schedule B, in order to bring total farm income into line with the estimate of output obtained from the census.

[4] J. R. Bellerby, "Gross and Net Farm Rent in the U.K., 1867–1938," *Journal of the Proceedings of the Agricultural Economics Society*, March 1954.

estimates of net income to obtain an estimate of total agricultural profits for inclusion in our estimate of net national income. Two adjustments are necessary in order to avoid duplication. First, we have to make a rough estimate of farmers' incomes below the exemption limit of £160 so that they are not included both here and in the estimate of intermediate income.[1]

Secondly, the incomes of farmers' relatives are included by Bellerby with agricultural profits and by Bowley with agricultural wages. Since the latter's estimate forms part of our estimate of the national wage bill, we have deducted a rough estimate of the annual relatives' wages from the series for agricultural profits.

12. *Agricultural Profits, 1856–66*

The first official *Agricultural Returns* were made in 1866, and it is not possible to make accurate estimates of agricultural output for earlier years. We have therefore assumed that the trend of profits is indicated by the trend of rents, and used an index of rents received [2] to extrapolate Bellerby's estimate of agricultural profits.

The second step was to devise some method of estimating the annual fluctuations of profits about their assumed trend level. Since profits were derived as a residual, the relative stability of wages and rents means that the fluctuations in profits are very largely those of output. Our approach was, therefore, to correlate the estimated profits with two of the variables which explain a large proportion of the fluctuations in the value of farm output: agricultural prices [3] and wheat yields.[4] By calculating the partial regression equation [5] of the deviations from trend of profits on these two variables over the forty years 1871–1910, and applying this to the two independent variables for 1855–66, we were able to obtain a very rough approximation to the fluctuations in profits.

The computed deviations were then applied to the trend represented by the extrapolated profit series and the result corrected for the duplication of relatives' wages as explained above (section 11).

[1] The estimate is deduced from the series for intermediate incomes (see section 14 below).

[2] R. J. Thompson, "An Enquiry into the Rent of Agricultural Land in England and Wales during the Nineteenth Century," *Journal of the Royal Statistical Society*, Vol. LXX, 1907.

[3] For this we used a weighted index of the Sauerbeck price indices, for 1850–1914, for ten products. The weights were based on the relative contribution of the products to output in 1867–69 as shown by E. M. Ojala, *Agriculture and Economic Progress* (1952).

[4] For 1852–83: J. B. Lawes and J. H. Gilbert, "Home Production, Imports, Consumption and Price of Wheat over Forty Harvest Years 1852/3–1891/2," *Journal of the Royal Agricultural Society of England*, Vol. IV, 1893. For 1884–1913: *Statistical Abstracts of the U.K.*

[5] The trends were represented by nine-year moving averages. The partial regression equation of profits (x_1) on prices (x_2) and wheat yields (x_3) was:

$$x_1 = 0{\cdot}873x_2 + 0{\cdot}569x_3 - 0{\cdot}324$$

The multiple correlation coefficient was +0·711.

13. *Evasion of Tax*

We complete our estimate of income subject to tax with an allowance, necessarily very rough, for incomes fraudulently evading taxation. For 1880 to 1914 our series is obtained by interpolation between the ratios of evasion to the new gross total Schedule D profits represented by Stamp's [1] estimate that evasion was £37 million in 1913 and Bowley's [2] estimate of £60 million for 1880. For 1855 to 1880 it is based on the ratios represented by Bowley's estimate for 1880 and an estimate of 52% for 1864.[3] Between 1855 and 1870 we have extrapolated the 1864 ratio on the assumptions that the rate of evasion decreased by only ½% per annum.[4] Therefore we have interpolated linearly.

14. *Intermediate Incomes*

In the estimates of incomes subject to tax it was assumed that all incomes below £160 were exempt from tax. It is therefore necessary to estimate all incomes below this limit which are not included in the wage-bill.

We have estimates, by Bowley,[5] of £314 million for 1911 and £120 million for 1880. We made a new estimate for 1860 of £90 million.[6] Centred on this estimate we assumed an increase of £1 million per year from 1855 to 1870 and then of £2 million per year to 1880.[7] From there we moved by linear interpolation to the estimate for 1911. Finally, the series was adjusted so as to exclude the farmers' incomes below £160 (roughly £37 million in 1911 and £20 million in 1880) which are already included in the estimate derived from the output data (see section 11 above).

15. *Wages*

For 1860–1914 we have taken Bowley's figures.[8] We extrapolated Bowley's average of £300 million for 1860–62 back to 1855 by means of Wood's index of money wages allowing for changes in the number in each

[1] Stamp, pp. 315–24.

[2] A. L. Bowley, *The Change in the Distribution of the National Income 1880–1913* (1920), reprinted in Bowley and Stamp, p. 69.

[3] 12th *Report of the Commissioners of Inland Revenue*. Quoted in Stamp, pp. 326–8.

[4] This differs slightly from the assumption made by Prest, p. 48. Our figure for 1870, for example, is £99 million compared with his estimate of £68 million.

[5] A. L. Bowley, *Wages and Income in the United Kingdom since 1860* (1937), pp. 91–2 and 139–41.

[6] This is based on our estimates of: (i) the number of non-wage-earners in receipt of independent incomes; less (ii) the number of tax-payers; multiplied by (iii) the average income of those in the intermediate income class.

[7] It may be noted that Prest (p. 32) assumed a constant amount of £120 million for 1870–80.

[8] For 1880–1914, Bowley, *Wages and Income*, p. 76 (including shop assistants). For 1860–79, Bowley "Tests of National Progress," Economic Journal, Vol. XIV, 1904, p. 459.

occupation.[1] A rough correction was made for changes in unemployment.

16. *Total Net National Income*

There are a few further adjustments which might be made to our estimates.[2] On the one hand, there is, first, an amount of about £30 million by which the assessed profits exceed the amount required for national income purposes.[3] This arises from such factors as the inability of the assessments to make proper allowance for continuous losses not set off against profits, and the inadequacy of the Inland Revenue allowances for depreciation and obsolescence.

Secondly, our estimate includes two items, which should be omitted: assessed income produced in the United Kingdom but paid to persons abroad (estimated to be £6·5 million in 1913),[4] and income from abroad passing through the British tax system but accruing to non-residents (under £2 million).[5]

On the other hand, there are a few marginal items which are not included in our estimates. The most important are the incomes of charities, hospitals, friendly societies, etc., and the annual surplus of co-operative societies, all of which are omitted because these institutions were not subject to tax. The former was estimated at £14 million in 1911,[6] the latter at £14 million in 1913.[6] From about mid-1912 an amount of about £7 million should also be added for the employers' contributions to national insurance funds.

On balance, therefore, it seems that at the end of the period the adjustments required roughly cancel out. In view of the smallness of any net adjustment which might be required in earlier years, and the absence of reliable annual data, we have made no corrections for any of these items.

If we now sum the corrected series of net income assessed to tax under Schedules A, C, D and E, agricultural profits, intermediate incomes and wages, we obtain the annual estimates of the net national income of the United Kingdom, at factor cost, for 1855–1914. (Column (9) of Table IV.)

The present estimate of £2,265 million for 1913 may be compared with Jefferys and Walters' estimate of £2,424 million, Prest's £2,368 million,

[1] G. H. Wood, "Real Wages and the Standard of Comfort since 1850," *Journal of the Royal Statistical Society*, Vol. LXXII, 1909.

[2] It should be noted that our estimate of net national income includes the income of soldiers and sailors abroad—estimated by Bowley at £20 million in 1911 (Bowley and Stamp, p. 14).

[3] This estimate is based on a detailed analysis by Stamp, pp. 174–203.

[4] Stamp, p. 424.

[5] Bowley and Stamp, p. 15.

[6] Stamp, p. 204.

and Bowley's £2,205 million.[1] These differences are comparatively slight in relation to the total national income, but of more significance in relation to the profits component, since the same estimate for wages and intermediate incomes in 1913 (£1,197 million) is used in all four estimates.

A comparison with a virtually independent estimate for 1907 made from the expenditure side suggests, however, that our income estimates may be too low. Our figure for net national income at factor cost in 1907 is £1,966 million, compared with an estimate of £2,096 million derived as shown in Table III:

TABLE III

Net National Product, 1907

	£ million.
1. Consumers' expenditure on goods and services	1,815
2. Public authorities' current expenditure on goods and services	152
3. Gross domestic fixed capital formation	150
4. Value of physical increase in stocks	(20)
5. Exports and income from abroad, less imports and income paid abroad	159
Gross national product at market prices	2,296
6. *Less* Rates and taxes on expenditure	−150
Gross national product at factor cost	2,146
7. *Less* Depreciation	−50
Net national product at factor cost	£2,096

Sources: 1. A. R. Prest assisted by A. A. Adams, *Consumers' Expenditure in the United Kingdom, 1900–1919*, (1954), p. 175.
2 and 6. Jefferys and Walters, pp. 8–9.
3, 4 and 7. A. K. Cairncross, pp. 121–2. See also section 2 above.
5. A. H. Imlah, *Economic Elements in the Pax Britannica* (1958), p. 75.

The expenditure estimate is largely based on the 1907 Census of Production, and is probably the more accurate of the two, but there are a number of difficult issues involved in the comparison (for this and other years), and the present comment is intended to draw attention to the discrepancy.

17. *Factor Incomes*

Our estimates have so far been presented in categories determined largely by the form in which the basic data were available. Our final task is to rearrange the estimates so as to indicate the approximate factor distribution of the total (Table IV). The basis for this was laid in the estimates of the corrected taxable income under each schedule (see section 7 above) and the remaining steps are quickly described:

[1] Jefferys and Walters, p. 25; Prest, p. 57; and Bowley, *Wages and Income*, p. 92 (we have deducted interest on the National Debt).

TABLE IV

Net National Income of United Kingdom at Factor Cost, 1855–1914

(£ million. Current Prices.)

	Rent.	Salaries and income from self-employment.	Agricultural income.		Industrial income.		Net domestic income.	Income from abroad.	Net national income.
			Profits.	Wages.	Profits.	Wages			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1855	80	104	57	72	123	184	623	13	636
1856	81	106	56	73	143	189	650	15	665
1857	83	108	50	74	151	174	629	16	645
1858	85	111	47	71	130	172	616	17	633
1859	86	110	45	71	135	192	639	17	656
1860	88	112	52	71	145	207	675	19	694
1861	91	114	55	72	170	205	707	20	727
1862	93	116	53	71	179	206	720	21	741
1863	93	119	56	70	183	217	738	21	759
1864	96	121	49	68	209	229	772	23	795
1865	98	124	50	68	210	248	798	24	822
1866	98	125	51	68	220	258	820	26	846
1867	99	126	62	70	199	256	812	28	840
1868	101	127	57	70	204	246	805	31	836
1869	102	131	40	69	236	256	834	33	867
1870	108	134	54	72	288	288	901	35	936
1871	111	137	56	72	307	292	975	40	1,015
1872	112	142	52	78	308	336	1,028	44	1,072
1873	116	146	64	77	313	381	1,097	52	1,149
1874	119	150	56	76	301	367	1,069	57	1,126
1875	121	154	58	76	298	361	1,055	58	1,113
1876	127	159	54	75	269	357	1,041	58	1,099
1877	129	163	46	73	264	356	1,033	56	1,089
1878	131	166	41	71	255	340	1,004	55	1,059
1879	131	170	22	68	253	332	976	56	1,032
1880	131	175	31	67	274	340	1,018	58	1,076
1881	132	183	34	66	288	355	1,058	59	1,117
1882	133	194	40	66	281	383	1,097	63	1,160
1883	132	202	33	66	269	385	1,080	64	1,153
1884	132	207	34	64	252	368	1,057	67	1,124
1885	134	211	31	63	250	356	1,045	70	1,115
1886	134	219	31	61	265	353	1,062	74	1,136
1887	133	228	30	61	277	376	1,105	80	1,185
1888	134	238	30	61	306	406	1,175	84	1,259
1889	135	251	31	61	326	457	1,261	89	1,350
1890	135	262	38	61	313	482	1,291	94	1,385
1891	134	267	46	61	291	480	1,279	94	1,373
1892	136	275	36	60	262	471	1,240	95	1,335
1893	137	282	32	59	264	470	1,244	93	1,339
1894	143	291	29	59	325	478	1,325	93	1,418
1895	146	299	30	58	329	491	1,353	94	1,447
1896	148	310	32	58	329	511	1,388	96	1,484
1897	150	318	30	58	354	523	1,441	97	1,538
1898	154	333	34	58	386	552	1,517	101	1,618
1899	156	344	40	58	422	577	1,597	103	1,700
1900	160	358	40	59	414	615	1,646	104	1,750
1901	162	367	40	58	385	609	1,621	106	1,727
1902	165	374	47	59	393	595	1,631	109	1,740
1903	168	385	38	59	363	589	1,605	112	1,717
1904	167	391	36	59	360	578	1,591	113	1,704
1905	168	403	40	60	392	589	1,652	124	1,776
1906	169	414	47	60	431	619	1,740	134	1,874
1907	170	431	48	61	450	662	1,822	144	1,966
1908	171	442	53	61	378	621	1,724	151	1,875
1909	171	452	43	61	395	627	1,749	158	1,907
1910	173	467	41	62	416	655	1,814	170	1,984
1911	174	481	58	63	442	681	1,899	177	2,076
1912	175	507	53	64	467	708	1,994	187	2,181
1913	177	530	46	65	517	730	2,065	200	2,265
1914	178	542	76	68	(403)	732	1,999	(210)	2,209

(i) *Rent.* This is the net rent from lands and buildings assessed under Schedule A.

(ii) *Salaries and Income from Self-employment.* This is the sum of salaries assessed under Schedule E, "employments" assessed under Schedule D,[1] intermediate incomes and the wages of shop assistants.[2]

(iii) *Agricultural Profits.* This is the amount as estimated in sections 11 and 12 above.

(iv) *Agricultural Wages.* For 1867–1914 Bellerby's unpublished estimate of agricultural wages was raised in the ratio of 63:46 to bring it to the total for 1911 given by Bowley.[3] To obtain figures for earlier years the estimate for 1867–69 was extrapolated by means of an index of farm wages,[4] and the result was crudely adjusted for changes in the numbers occupied in agriculture.

(v) *Profits in Industries and Services.* This is the sum of the net assessments under Schedules C and D, plus the estimated amount of evasion, less income from abroad and less "employments" under Schedule D already included in salaries.

(vi) *Wages in Industries and Services.* This is the total wages bill less agricultural wages and the wages of shop assistants.

(vii) *Net incomes from Abroad.* This is the amount of the net interest and dividends on foreign investment as estimated by Professor Imlah.[5] This is deducted from total net national income to give net domestic income.

These estimates of factor incomes are less reliable than the underlying estimates to the extent that certain additional adjustments have been required, but if used with caution they should give a reasonably correct picture of the main trends. In general, all the series are more reliable after about 1880. One point which should be noted is that the conversion of private firms into companies means that salaries are progressively enlarged at the expense of profits.[6] At a very rough guess, in 1913 the amount which would formerly have been classified as profits but was then taken out as, say, the salary of a managing director, might be put at £15 ± 5 million.

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[1] The gross amount of "employments" is given in the annual *Reports* from 1898/9 onwards and for earlier years we extrapolated this series by reference to the movement of Schedule E. The ratio of net to gross income was assumed throughout to be the same as for Schedule E.

[2] For 1880–1914 their wages are given by Bowley, *Wages and Income*, p. 76. For earlier years they have been roughly estimated by extrapolation of his figures.

[3] Bowley and Stamp, p. 25.

[4] A. Wilson Fox, "Agricultural Wages in England and Wales During the Last Half-century," *Journal of the Royal Statistical Society*, Vol. LXVI, 1903.

[5] A. H. Imlah, pp. 72–5.

[6] See Stamp, pp. 216 and 266.

REVIEWS

The Structure of Property Ownership in Great Britain. By E. V. MORGAN. (London: Oxford University Press, 1960. Pp. xi + 207. 32*s.* 6*d.*)

IN view of the great amount of work that has been done in recent years in compiling national balance sheets for other countries, it is distressing to record that Professor Morgan's book is a pioneer attempt to produce a set of integrated balance sheets for Great Britain. There have, of course, been many attempts to estimate a value for the national capital, a unique figure in which all internal debts are consolidated out of existence, but estimates of asset holding have been limited to a few types of holder and a few types of asset. It is the great merit of this book that it covers the whole field of property ownership, and thus enables one to test the consistency of the estimates by establishing whether the total amounts in issue have been satisfactorily accounted for.

The final results of the work are presented in four matrix tables summarising inter-sector indebtedness for each of the years 1953–55 and for the average of 1953–55. For this purpose the sectors are defined on the same basis as for national-income purposes in the official statistics, and the tables thus provide a balance sheet counterpart of the regular Blue Book tables. The matrix tables show for a broad asset classification the assets and liabilities of a number of different organisations within each sector, and consolidated balance sheets for each sector are presented in the text.

The matrix tables are built up from estimated balance sheets for persons, the various types of organisation and the external sector. In the construction of these separate balance sheets several methods of estimation were necessarily used. Wherever possible, the basis taken was the published summaries of balance sheets which are available for insurance companies, quoted non-financial companies and the many types of body under the supervision of the Chief Registrar of Friendly Societies. In other cases, such as public corporations, banks and other financial institutions, the number of separate organisations was small enough for individual balance sheets to be added together, while in the government sector published balance-sheet information had to be supplemented with a good deal of estimation. This left three main types of organisation for which the aggregation of individual balance sheets was the only possible approach but of which the population was both large and ill-defined—unquoted non-financial companies, pension funds and a variety of non-profit organisations. Professor Morgan wisely decided that it would not be an economic use of small resources to probe deeply into the world of the smaller companies, but we all owe him a debt for the painstaking sample investigations which he conducted into pension funds and the broad field of non-profit organisa-

tions, such as charities, educational institutions and the London livery companies.

For the estimation of the assets and debts of persons and unincorporated businesses Professor Morgan relied largely on the death-duties statistics. Although the book contains several pages of discussion on the assumptions underlying the use of these statistics for the estimation of personal wealth, it is strange that the problems raised by the exemption of certain types of settled property are nowhere discussed; their exclusion from the Inland Revenue statistics could make quite a difference to the totals of certain types of assets which are estimated to be in the beneficial ownership of individual persons. A further point which would have merited discussion is the use of the Registrar General's figures for social-class mortality as a basis for the mortality multipliers without consideration of the many statistical pitfalls which are inherent in these figures.

Professor Morgan was unfortunate in having started his work before the mass of statistical material collected by the Radcliffe Committee was available. The Report and the supporting Memoranda and Minutes of Evidence apeared while the book was in print, but the author decided not to delay publication to revise his estimates. This was undoubtedly a wise decision. Where direct comparison is possible between the Radcliffe figures and the estimates made in this book, it seems that the broad picture would have been unaffected, and in many other fields the evidence offered by the Radcliffe tables on the sort of problems under consideration was by no means unequivocal.

What was obviously needed in a pioneer work of this type was the presentation of the broad picture of inter-sector indebtedness, and for this purpose estimates of probable orders of magnitude were of more use than confessions of ignorance. In the end there emerge a number of discrepancies between the known total of liabilities under each heading and the amounts discovered as assets of the various sectors, and these discrepancies are carried to columns of " unallocated items " in the matrix tables. The isolation of such discrepancies is one of the greatest services rendered by this book to future investigators.

The major discrepancy lies in the total of notes, coin and bank deposits, for which balance-sheet information provided evidence of holdings amounting to roughly half of the known total. Here the analysis of bank deposits by type of holder provided by the Radcliffe Committee will undoubtedly prove of considerable help, but it is cast in a form which makes comparison with balance-sheet information extremely difficult. Many of the other discrepancies will probably be narrowed as a result of the Radcliffe-inspired investigations by official statisticians into such trouble spots as the smaller companies, local authorities and the external sector. There still remain many problems which arise from the nature of the statistical evidence used in this type of study.

Apart from the many problems associated with the use of the death-duty statistics for the estimation of personal wealth, some of which were noted above, the use of published balance sheets raises questions of its own. Professor Morgan notes the problem of probable swings in balance-sheet items during the course of the organisations' financial year, and the consequent discrepancies introduced by adding items from balance sheets published at varying dates. This is one problem on which direct evidence should be sought, and further work could usefully be done on relationships between book values and market or nominal values for different types of organisation. There is also the possibility of obtaining evidence about holdings from the registers maintained by debtor bodies. The evidence so obtained raises further questions of interpretation, not the least of which is nominee registration, but it can be of considerable use in conjunction with balance-sheet information.

It is a measure of the importance and success of Professor Morgan's work, however, that one should already be thinking in terms of refining his estimates in various ways rather than of covering again any of the ground which he has gone over.

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Ricardo on Taxation. By C. S. Shoup. (New York: Columbia University Press (London: Oxford University Press), 1960. Pp. 285. 48*s*.)

We have tended to forget the full title of Ricardo's *Principles of Political Economy and Taxation.* Professor Shoup has now come to remind us of the last part of it. He points out that Ricardo's tax analysis makes up more than one-third of his *Principles*, extending over the eleven chapters from VIII to XVIII and other passages here and there. (His correspondence, articles and speeches, on the other hand, contain very little on it.) However, the actual writing of these chapters took Ricardo a very short time indeed: just one month, from mid-October to mid-November 1816—the same time that it took James Mill to read them. Professor Shoup is surprised at this "extraordinary rapidity"; and he may well be, if we think that it has now taken him fifteen years (with some interruptions) to go through the same material. But his conclusions, it seems to me (Shoup's Chapter XVI: "An Appraisal of Ricardian Tax Analysis"), provide the elements of an answer. Ricardo's analysis is very little connected with the actual taxes prevailing in his time. "His chief interest lies in the broad economic consequences of taxes in general, particularly with respect to: (*a*) distribution of national income . . .; (*b*) accumulation of capital . . .; (*c*) the price level" (p. 249). Moreover, Ricardo is a superb logician. One is strongly tempted to look at the whole Ricardian tax analysis as mainly, though not entirely, a remark-

able intellectual exercise. The rapidity of composition then becomes more understandable. Ricardo had done the hard job already in the previous chapters and was simply concerned with working out the logical consequences of his theoretical scheme.

Professor Shoup is, of course, aware of the importance of Ricardo's general theory and devotes his second chapter to a clear and accurate, though incomplete, presentation of Ricardo's theoretical model. Then, in the subsequent analysis, he takes up, one by one, Ricardo's chapters on taxation, in the same order Ricardo wrote them: taxes out of capital and out of income, taxes on agricultural raw produce, taxes on rent, tithes, taxes on land, taxes on gold and houses, taxes on profits, taxes on wages, taxes on manufactured commodities and analysis of war debts. All this extends from Professor Shoup's Chapters III to XI. Then Chapter XII is devoted to taxes and bounties on foreign trade (Ricardo's Chapter XXII), Chapter XIII to the concept of taxable capacity of a Nation (Ricardo's Chapter XXVI), and Chapter XIV to miscellaneous tax issues. There follows a chapter (the XVth, before the XVIth and last which has been mentioned already) where Professor Shoup gives a summary of the British tax system of Ricardo's day, mainly taken from S. Dowell's *History of Taxation in England*. The volume ends with three appendices containing some mathematical analyses, references to taxation in Ricardo's letters not dealt with in the text and a bibliography of works on Ricardo.

Professor Shoup's analysis is searching and meticulous. He checks every Ricardian statement; he compares connected propositions in different chapters and supplements them with information and clarification from Ricardo's letters and speeches. When he thinks Ricardo is wrong he corrects him. Most of the time the corrections refer to unfair presentations by Ricardo of his opponents' arguments. At other times Professor Shoup finds Ricardo's propositions less general than they were intended to be, especially in connection with land rent, as Ricardo always seems to be thinking in terms of extensive (and not of intensive) rent. At yet other points Professor Shoup goes too far in questioning and seeing complications in Ricardo's analysis. This is mainly due to a couple of problems that Professor Shoup has neglected. The first of them refers to the role of gold in the Ricardian system; Professor Shoup relies too often on the use of terms derived from the better-known quantity theory of money, and he always speaks of the "stock of money" where Ricardo talks of the *value* of the amount of gold. The second problem refers to the basic difference in the determination of prices of necessaries and luxuries in the Ricardian system, whereby any difficulty in the production of—or any tax imposed on—a commodity always causes a change of its price, but in the case of necessaries it also causes a change of the rates of wages and of profits. Had Professor Shoup touched on these two problems at the beginning, his analysis would have run much more smoothly in some places (especially in Chapters VIII

and IX), and some passages in the Ricardian analysis might have been presented in a less-complicated and less-problematical way.

In spite of these points, Professor Shoup's book is a very good piece of scholarly work. I should suggest reading each chapter of it jointly with the chapter in Ricardo to which it refers. From the close correspondence between the two, one would think that the author himself had this in mind—though he does not say it explicitly. It may be useful to suggest it here, as Professor Shoup's book, if taken on its own, might be found rather hard and arid to read, while if read jointly with Ricardo it may offer a great deal of help.

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The Economics of Real Property. An analysis of property values and patterns of use. By R. TURVEY. (London: Allen & Unwin, 1957. Pp. 150. 16*s*.)

As is pointed out in the Preface, the neglect of the subject of this book by economists in recent years is in marked contrast to the later part of last century, when "property taxation, for example, was widely discussed, and many books and official reports were published." It is also rather surprising in view of its great practical importance, witness the prevalence of muddled thinking which has given rise to such ideas as the famous "floating value" of the Uthwatt Committee and been the basis of such policies as the compensation and betterment provisions of the Town and Country Planning Act of 1947. It seems at the moment that land values might once again become of first-rate political importance.

It can, of course, be urged that there is nothing in these matters which is not susceptible to general economic analysis, and, indeed, Mr. Turvey's treatment—an elaboration of "the price mechanism in the property market"—bears this out. Yet,

> "Just as labour has sufficient peculiarities to justify labour economics as a separate branch of study, so the heterogeneity, indivisibility and institutional peculiarities of real property make some separate treatment worth while. The subject deserves, but often fails to get, a separate chapter in the textbooks as much as does the labour market."

There is here, however, a danger: though needless to say Mr. Turvey himself avoids it. The great text-book, Marshall's *Principles*, does have separate chapters on land values, which can be regarded as parallel with the three devoted to the special characteristics of labour; indeed, some of Mr. Turvey's points about the relations between average and marginal returns of building, as illustrated by a skyscraper, are enshrined in a footnote in the *Principles* (p. 448). But in the subsequent development of "labour

economics" the problems have often become so overlaid with details of special cases that the basic analysis has been lost; there are many examples in the literature of points noted by Marshall as qualifications which need to be taken into account being announced as original discoveries and blown up into new theories of wage determination. It would be unfortunate if the same were to happen to the economics of real property.

The gap here is, indeed, rather one of the economic ignorance of the practitioners and even more of the policy-makers. And it is this gap which Mr. Turvey helps to fill, by showing that in spite of the special circumstances of the case, "real property is one among several types of factor of production, so the general theory of pricing and allocation of the factors of production applies to it."

Apart from a short chapter on agricultural land values, he is concerned entirely with urban property. The basic analysis is given in four chapters. The first defines the technical terms and shows that the relevant transactions are property interests of various kinds and that payments which are "a combination of premium and instalment" can be expressed in terms of rents and prices. There is then a discussion of the determinants and determinateness of prices of urban property, followed by a chapter on the nature of the market which analyses the factors affecting the general level of and movements in rents and prices, with specific attention to office rents, housing rents and rent control. Finally, there is a short chapter on the pattern of urban property values, with a distinction between "general" and "special" accessibility—a parallel with non-homogeneity in the labour market.

Mr. Turvey then turns to four specific topics: taxation of property in the form of rates, taxation of site values, intervention by the State in freedom of contract, and Compensation and Betterment. The analysis is conducted with elegance and brevity; indeed, at times the reader wishes that Mr. Turvey were a little less austere and would allow himself greater freedom of comment than can be conveyed in even the most pregnant of asides. Empirical evidence to support the analysis is often admittedly inadequate. Mr. Turvey has undertaken no specific empirical investigations himself (though he is clearly familiar with the workings of this particular market) and states that "though it would be desirable to cite case-studies . . . the sad fact is that information is difficult to obtain." Thus he has been driven back to the official reports of the late nineteenth century, and a small crop immediately after the First World War; and very illuminating some of them are. The final chapter on Compensation and Betterment is, however, different in kind from the rest; not only is it more than twice as long as any of the others in the book but it provides an historical account and detailed commentary on legislation which is elsewhere lacking. Although it is full of acute comments (including a possible rationalisation of "floating value"), perhaps a more closely deductive

treatment more comparable to that of the other chapters would have left the matter rather less in the air.

Mr. Turvey has filled only part of the gap to which he draws attention. For one thing, he is concerned solely with the allocation of resources, and rigorously eschews any discussion of distributive problems. For another, there is no discussion of property law, which is of some importance in determining the "institutional peculiarities" of the market. Nevertheless, we are greatly in Mr. Turvey's debt for re-opening these matters and for the contribution he makes to them. It is to be hoped that others will now follow, both to extend his analysis and by empirical studies to fill some of the open spaces in this still largely empty economic box.

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The Causes of Wealth. By J. Fourastié. Translated and edited by T. Caplow. (Glencoe, Illinois: The Free Press, 1960. Pp. 246. $5.00.)

Professor Fourastié is well known both in France and elsewhere for his work in the field of productivity, and was the first chairman of the Productivity Committee of the O.E.E.C. The present book—a revised version of the French edition published originally in 1951—is a study of the influence of *machinisme* or technical progress on the material conditions of life. Professor Fourastié examines evidence on changes in incomes and levels of living since the Middle Ages—primarily in France, but including some comparisons also with data for other countries. He seeks to relate these changes to productivity trends. An account is also given of changes in the "style of life"—including occupational factors, duration of work, education, housing, health and life expectancy. There are thirty-eight major tables (apart from text tables) many of them containing series going back to the early nineteenth and even eighteenth centuries.

The book is at its best in commenting on the broad sweep of economic history and in the ingenuity with which all kinds of sources are mobilised to throw light upon differential productivity trends in various sectors of the economy. Professor Fourastié has a fine contempt for the "thousands of pages of classical history" in which the fantastic famines that occurred at frequent intervals prior to about 1700 are considered to warrant only a few paragraphs. He traces historical progress in terms of changes in the composition of family budgets. Differences in levels of living both in time and space are classified, in order of increasing *per capita* income, according to whether the bulk of consumption expenditure goes for millet, wheat, a balanced food budget or, at the highest level of income, for non-food items.

There are many fascinating insights in the book. "In 1702," says

Professor Fourastié, "it required 42,500 laborers' hourly wages to buy a mirror four meters square. In 1850 it still took 7,200, while in 1950 it required only 200. . . . Purchasing power has been multiplied by 210 as far as mirrors are concerned. During the same period it has decreased by 35 per cent at the barber's" (p. 87). Typical of the author's lively approach to his subject is a lengthy footnote in which he traces the history of the "civilisation of glass" through paintings of interiors from Giotto to Tintoretto (pp. 149–50). Looking into the future, and noting the progressive displacement of labour from those types of productive activity responding to technical progress, he foresees that:

> "The typical activity of the man of our future civilisation (like the present 50 per cent of the citizens of the United States or 30 per cent of the French—which is by no means negligible—or 45 per cent of the English or 20 per cent of the Russians) will be an occupation not much affected by technical progress. The general conditions of labor will not be very different from those prevailing in the world before the industrial revolution. . . . The barber will work 50 years from now much as he worked 200 years ago" (p. 163).

Although there is much in the book that is rewarding and stimulating the exposition is not rigorous. A central thesis of the book is that "long-term price trends are determined by technical progress" (p. 37), but this idea is never thoroughly explored and its limitations indicated. Differential productivity movements in various sectors of the economy are left to be inferred from the material on changes in the purchasing power of incomes over selected products, and are not examined directly in any systematic fashion.

Two of the basic "theorems" of the book are stated by the author as follows: "The first theorem of the level of living is that *consumption in a closed economic system cannot permanently exceed production.* (A closed economic system is that of any area whose exterior commerce plays a minor part.) This fact is logically obvious and also more important, it is experimentally demonstrable . . ." (p. 120)—and Professor Fourastié goes on to give such a demonstration. "The second theorem of the level of living is this: *Not only does total production determine total consumption, but in the short term the structure of production also determines the structure of consumption*" (p. 121).

The author is not well served by the English rendering. The very title is misleading—the French version was called, much more appropriately, "Machinisme et Bien-être." This has occurred despite the fact that the author himself states in his Introduction that "in the title of this work, the word *machinisme* could be legitimately replaced by such terms as technical progress, organisation of labor, or productivity of work" (p. 17). The translation and editing are in general rather weak. For example, the mirror size in the story referred to above is said to be "four yards square" on p. 37, "four meters square" on p. 87 and "four square meters" on p. 129.

Again, it is frustrating to find the following source reference for Table VI: "See French edition for detailed sources of this and following tables." The same goes for Table XXV. Table XVIIIa, based on the 1951 edition of Colin Clark's *The Conditions of Economic Progress*, contains several errors. The book shows other signs of having been put together hurriedly.

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The Antitrust Laws of the U.S.A.: A Study of Competition Enforced by Law. By A. D. NEALE. (London: Cambridge University Press for the National Institute of Economic and Social Research, 1960. Pp. xiii + 516. 45*s*.)

Antitrust Policy: An Economic and Legal Analysis. By C. KAYSEN and D. F. TURNER. (Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1959. Pp. xxiii + 345. 60*s*.)

Monopoly in Economics and Law. By D. DEWEY. (Chicago, Illinois: Rand McNally & Co., 1959. Pp. 328. $5.75.)

Mergers and the Clayton Act. By D. D. MARTIN. (Berkeley and Los Angeles: The University of California Press (London: Cambridge University Press), 1959. Pp. xii + 351. 48*s*.)

Merger Movements in American Industry 1895–1956. By R. L. NELSON. (Princeton, N.J.: Princeton University Press for the National Bureau of Economic Research (London: Oxford University Press), 1959. Pp. xxi + 177. 40*s*.)

A & P: A Study in Price–Cost Behaviour and Public Policy. By M. A. ADELMAN. (Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1959. Pp. xv + 537. 80*s*.)

Proceedings, International Conference on Control of Restrictive Business Practices. Ed. C. D. EDWARDS. (Glencoe, Illinois: The Free Press of Glencoe for the Graduate School of Business, The University of Chicago, 1960. Pp. xix + 380. $10.)

The Control of Monopoly in the United Kingdom. By P. H. GUÉNAULT and J. M. JACKSON. (London: Longmans, 1960. Pp. ix + 197. 25*s*.)

IN recent years every country in Europe and North America has tightened its "anti-trust" laws; indeed, several are now for the first time attempting to regulate monopoly and restrictive practices. Most countries look to the rich experience and comprehensive system of control in the United States, but many observers have failed to distinguish the parts of their policy which are motivated by economic considerations from the parts which are not. One merit of Mr. Neale's admirable book is that he draws attention to these differences.

His object is to describe and to assess, primarily for a British audience,

the actual working of these laws in the United States. In Part I he examines, with a fine sense of judgment, the content of the law, such as price fixing, monopolisation, international cartels and its administration. In each chapter he establishes obvious examples of the law and then continues " down the legal scale " to the borderline cases, which receive most attention. The shifting scope of anti-trust is clearly traced, in particular the transition from a more negative approach (literally " anti-trust ") to a more positive one (maintaining or promoting competition). He highlights the importance of *intent*; for example, " monopolising is not simply dominating an industry but intending to dominate," and " what is clear and unmistakeable in a *per se* offence (such as price fixing) is not its economic effect but its restrictive intent ": and he shows the close relationship between " intent " and the Rule of Reason.

Part II of his book, in which anti-trust is assessed, is more controversial. He distinguishes two motives for policy: one, at the level of political philosophy, favours competition, supports " small business " and holds that the possession of economic power—principally but not exclusively by " big business "—is undesirable in itself; the other more economic philosophy holds that monopoly will disturb adversely resource allocation and efficiency. Emphasis on the former is greater in the United States than in Britain, and is an expression of the view that power needs " checks and balances," and that a " government of laws " is preferable to, and a protection against, a rule of men. In Britain the political component is less strong, there being less fear of power; consequently the economic element is more prominent. Although this attitude to economic power is probably the most outstanding difference in this field between Britain and America, the author does not examine whether economic variables, such as the size and structure of the economy, may not also affect a country's anti-trust policy. Nevertheless, for empirical reasons Mr. Neale finds the American approach attractive and substantially suitable for Britain and other industrial countries, although he does not appear to favour a law to regulate mergers which, in Britain, is probably desirable.

He concludes that *mobility*—the flow of resources to employment of maximum utility—rather than competition is the fundamental concept for analysing the conditions of economic efficiency; and he then sees mobility as an objective. Competition is one means of achieving mobility, but it is " not so consistently favourable to mobility as to be an unqualified object of policy." Even if one regards income distribution as of secondary importance, as he does, he leaves unanswered how one could judge whether there is sufficient mobility in a market, and unstated even the general nature of policy proposals to effect the right degree of mobility. Anti-trust policy is likely to become even more confusing than at present if competition remains an important political objective, while mobility is desired for economic reasons. Fortunately his discussion results in hypotheses which seem testable (for

example, his assertion that " oligopoly is better for mobility than competition between larger numbers of firms "); clearly much more analysis and empirical research is needed before the reader will be convinced. (Mr. Jack Downie's tests of mobility in his recent book *The Competitive Process* would seem to be relevant to this purpose.)

The criticisms notwithstanding, Mr. Neale has produced a readable book (which would be improved if it had a subject index) that all students of competition and of the United States anti-trust laws will find stimulating and instructive.

As if to illustrate Mr. Neale's distinction between the economic and political components of anti-trust, Professors C. Kaysen and D. F. Turner's persuasively argued thesis is that market power is undesirable and that it should be limited, except where it has been created or maintained by economies of scale, or the legal use of patents, or where it is a consequence of the introduction of new products, processes or marketing techniques. " A firm possesses market power when it can behave persistently in a manner different from the behaviour that a competitive market would enforce on a firm facing otherwise similar cost and demand conditions." The authors believe that evidence of market power can only be found in a combined study of market structure and business behaviour. In developing their thesis and its policy implications, they first survey market structures in the American economy. This involves the identification and statistical analysis of both structurally oligopolistic markets and the " exempt " sectors of the economy, and is an important contribution in itself. The " undue market power " possessed by oligopolists is then seen as the main target of attack.

The authors would make the statutory reduction of concentration by dissolution, divorcement and divestiture a permanent feature of the anti-trust laws. A draft law reads that " market power shall be conclusively presumed where, for five years or more, one company has accounted for 50 per cent or more of annual sales in the market, or four or fewer companies have accounted for 80 per cent of sales." (Then follow the exceptions mentioned above.) To implement this law, adjudication should be in a special " Economic Court," and the prosecuting function in a new administrative agency, the " Industrial Reorganisation Commission." Complementary to this are proposals about the prevention of mergers, which are mentioned below.

The economic and legal implications of this policy are discussed with extraordinary thoroughness. Clearly it originates as much from the area of political philosophy as from economic analysis. Market power becomes " reasonable " when judged principally by the *causes* of oligopoly, rather than its effects. Presumably an oligopoly not attained by one of the approved methods might subsequently win approval, if, for example, it resulted in product innovations; but this eventuality appears to be pre-empted. It is true that the authors examine the likely adverse effects of lower concentra-

tion on incentives, innovation and efficiency, and that they "give great weight to the achievement of desirable economic performance." But it is considered unlikely that incentives will be blunted because the means of growth that would exempt the application of the law are still open, and innovation is unlikely to be affected because "we are talking only in terms of business units at least as large as those necessary for efficient production and distribution" (p. 84). Without denying that giant firms are larger than necessary to achieve efficiency and progressiveness, how can one know where, in each case, the line should be drawn?

It is startling to discover that the authors recommend an immense programme of judicial inquiry and possibly administrative effort without having estimated either the likely proportion of price-makers who must be converted to price-takers or the proportion of the economy which is likely to require reorganisation, and without there being clear *evidence* as to the likely consequences. Although the authors' expectations may be correct, before the economy is so severely disturbed—if that should be involved—one would like to be convinced of it. The opportunity exists for studying the consequences of divorcement, dissolution and divestiture in a limited number of cases; what was the outcome? One would also like to have assurance that the "cut-off" percentages defining "unreasonable power" are scientifically based and that they are universally applicable. The nature and importance of the market power that could be exercised by large *diversified* companies is inadequately examined—a critical weakness in the analysis, and so is the significance of the structure of buyers in relation to the market power.

Nevertheless, many economists in the United States accept these proposals, and recently additional support has come from those who believe that oligopolistic pricing is a significant cause of inflation. Mr. Neale believes that the best solution will be found in the application of the existing law, Section 2 of the Sherman Act, which might be interpreted as "intent to oligopolise," each firm being charged with intent to monopolise its own segment of the market. This is appealing because it extends existing law without involving Kaysen and Turner's institutional changes, but it seems likely to be too difficult to apply. Although there will be disagreement on these matters, the authors have produced a fine analytical study which is an outstanding contribution to the subject.

In design, Professor Donald Dewey's book is complementary to Mr. Neale's, for his ambitious aim is "to give an account of what economists and lawyers have thought about monopoly since the subject first received their serious attention." He analyses the theory of cartels and compares the merits of cartels and consolidation. Then, after discussing monopoly as revealed by empirical studies, monopoly theory and monopoly at law, he considers the anti-trust laws more generally, and mentions some features of monopoly policy in Britain since 1890.

The outcome is disappointing. The first third of the book fits together

uneasily, although much of the remainder, which is principally devoted to a discussion of the anti-trust laws of the United States, is presented clearly. Inevitably this is a highly selective and summary account of the development of thought. It will not satisfy the experienced lawyer or economist, and would be misleading for students. There are some strange omissions: for example, " workable competition " as a concept does not seem to be mentioned, neither does J. M. Clark's famous 1940 expository article; E. S. Mason's work is ignored; and in the theoretical discussion of monopoly and welfare no mention is made of the " second best " approach. His welfare statement on pp. 302–3 is incorrect, and readers may also note that the public interest presumption in the British 1956 Act, on p. 297, is wrong in two respects.

The author makes a number of interesting observations which stimulate the reader to seek elaboration. For example, he sometimes mentions the state of economic thought at the time of particular legal cases (the most striking is the first United States Steel Corporation case, which in 1911 involved oligopolistic price leadership); unfortunately he does not attempt to comment on at length or to generalise about the interaction of theory, empirical research and the law. And he believes that, " at the state level, there is scarcely an important ' intra-state ' industry that has not somewhere received back from the legislature the rights of collusion taken away by the court " (an assertion which needs some qualification to convey the correct legal position); it is a pity that he finds the state government effort against cartels " too frivolous to merit our attention " since further discussion would appear to be justified. Nevertheless, he has made the points which others may usefully follow up.

The author seems more prepared to find good in monopoly and restriction than most other writers in the United States, but he concludes, somewhat paradoxically, that " businessmen and labour leaders who do not seek for themselves all monopoly power that the law will allow do not inspire confidence. Let us hope, however, that critical study of anti-trust problems can create a climate of opinion that regularly frustrates such striving for private advantage at public expense." Although these are puzzling (and certainly controversial) statements with which to end a book, they illustrate a dualism that runs through much thought about anti-trust in the United States.

The problem of mergers, in particular the significance of an increase in economic power by the unified company in relation to subsequent performance, has long disturbed those in the United States who wish to see competition maintained. Most writers anxious to limit private economic power have proposed the more urgent and forceful application of the law in preventing mergers.

Although the 1950 Celler–Kefauver amendment to the 1914 Clayton Act is the most significant post-war change in the anti-trust laws of the United

States, the nature of the change is frequently misunderstood. Professor David Dale Martin, in a carefully annotated analysis, explains that Section 7 of the 1914 Act prohibited the acquisition by one corporation of the *stock* of another corporation, where the effect may be substantially to lessen competition or to restrain trade between the corporations, or to tend to create a monopoly. But a corporation could still merge by acquiring the *assets* of another corporation (which the law could only prevent on the test of illegality under the Sherman Act, which emphasised " intent "). The 1950 amendment brought the acquisition of assets within the Clayton Act.

The author shows that it is a mistake to regard the 1950 amendment as simply rectifying an unintentional omission in the 1914 Act. In 1914 the legislators were aware that corporations could merge by the acquisition of assets; indeed, it was a common procedure. The omission was deliberate because the Act was intended to strike only at *holding companies*, in particular where the true ownership of subsidiary companies was concealed. Not only did the 1950 amendment put asset and stock acquisition on the same footing, it also broadened the standard of illegality. Previously it had been the effect on competition between the acquired and acquiring corporations which was relevant; under the 1950 amendment this became the effect on competition " in any line of commerce in any section of the country."

Thus Professor Martin's thesis is that the 1950 amendment was a major substantive change in the anti-trust laws. The study is convincing and should have disposed of a misconception that has been remarkably persistent. He has no policy proposals, but concludes by pleading for more theory that will provide " discerning insight " into the probable effects of mergers.

It is convenient to mention here that Kaysen and Turner propose that any acquisition of a competitor by a firm with 20% or more of its market is *prima facie* illegal, and that any merger of competitors who together constitute 20% or more of a market is also illegal, unless the acquired company is in failing or obviously declining circumstances (a condition Dewey also mentions), or unless the acquisition will yield economies of scale or resources that cannot be effected feasibly in any other way. The authors do not propose that conglomerate mergers should be prevented because they facilitate entry. Before embarking on this more limitist policy it would seem sensible to go further than Professor Martin and call for more study of the motives behind merger activity, and of the origin of the forces which the law is attempting to frustrate.

Professor Ralph L. Nelson attempts to provide such an explanation. (He is not, of course, the only person to have done so.) His principle contribution is to provide a new analysis of merger activity in United States manufacturing and mining industries in the hitherto relatively uncharted period 1895–1920. In particular, he examines in detail the peak activity in the years 1898–1902, and tests some hypotheses of causation. But also he uses other people's series to compile a profile of merger activity 1895–1956, which

he then relates to stock prices and industrial production. And he compares the early British and American merger movements.

His principal conclusions are that the 1898–1902 merger boom, the most spectacular in American history, was related to the newly achieved development of a broad and strong capital market, together with the existence of institutions which enabled the organisers of mergers to use this market. The desire for market control and profit protection were also thought to have been important. Over the longer period 1895–1956 the peaks in merger activity were ahead of peaks in industrial and general business activity, and coincided with the peaks in stock prices.

Although I have no independent means of knowing whether the new statistics are reliable, an unpublished study by Professor Bernard Kemp of Michigan State University, to whom I am much indebted, suggests that Professor Nelson has substantially underestimated the number of mergers in the electrical industry. This casts doubt on the reliability of his other figures, and therefore on his conclusions, which largely depend on an analysis of the timing of merger activity.

It must also be mentioned that not all of the author's tests are entirely satisfactory. For example, in examining the retardation hypothesis it makes little sense in Table 44 to use *unweighted* arithmetic means of growth rates. A glance at the original data on pp. 156 and 157, non-ferrous metals in particular, illustrates the point and also reveals that his method involves substantial double counting. Moreover, one would wish to use a concept of "merger" appropriate to the task, and it is not clear that for testing hypotheses of the *causes* of mergers it is best to record the date when control of the acquired company passed to the acquiring company. If dates of the initiation of merger negotiations were used instead, turning-points would be shifted backwards which, particularly when using quarterly data, might affect his conclusions. Although obviously the study must be used cautiously, it provides a useful basis for further analysis.

In part consistent with a policy of restraining undue economic power is the desire to protect small business. Almost inevitably, however, this results in discrimination in favour of small businesses, which are most often in the distributive trades, and in the *reduction* of competition. Professor M. A. Adelman's study of the price policy, selling and buying habits of the Great Atlantic and Pacific Tea Company supports the detailed appraisal of a criminal prosecution involving this policy, which lasted from 1942 to 1949, and of the civil suit which continued thereafter until 1954.

The A & P, which operates a grocery chain, accounted for less than 10% of the market, and it was accused of conspiring to restrain and to monopolise the trade in food in violation of Sections 1 and 2 of the Sherman Act; but in effect the issues centred around price discrimination and the principles of the Robinson Patman Act. Complicating factors, which created confusion in the minds of the court, were that the company was integrated backwards into

wholesaling, brokerage and manufacturing, and that it was integrated sideways, so that sustained store losses on one product or in one area would not necessarily result in the demise of that store. Many issues concerned the extent, the origins and use of the company's market power, whether this was derived from efficiency, or vertical integration, or both. Was a firm that purchased directly from suppliers entitled to a discount equivalent to a brokerage charge? Did suppliers so value the A & P bulk business that they offered lower prices, or did the A & P force suppliers to charge less? Was "selling below cost" simply making losses or predatory behaviour? The author's view is that such questions can be answered only by a close examination of both economic structure and performance, and that where entry is easy, a low price policy, although damaging to rivals, is not to be condemned. Distinction was drawn between economic price discrimination and legal discrimination, in which only price uniformity, irrespective of cost differences, is equated with non-discrimination. Professor Adelman vigorously attacks the courts for using preconceived notions, misinterpreting facts and accepting vast quantities of evidence that appeared to be irrelevant. The whole case is shown to be a shocking example of insufficient and mistaken economic analysis.

It does not seem, however, that Professor Adelman (or the Federal Trade Commission) has examined in sufficient detail the structure of A & P's competitors in local retail markets, or the variability of the company's competitive position in different retail markets, and perhaps he underestimates the psychological impact of A & P's absolute size on entry. It is relevant to know in more detail what effect the company's size had on competition in the retail market. Nevertheless, the author has succeeded admirably in correctly applying economic principles to a mass of detailed factual information. The study is a model of its kind, and is an important contribution to the scarce literature on the economics of distribution. No direct policy proposals were made as a result of this study, and the author appears to accept that such irreconcilable approaches to anti-trust as competition and protectionism "will continue to co-exist more or less non-peacefully."

When a foreigner looks to the United States for guidance in anti-trust affairs he is likely to be bewildered by these contradictions but impressed by the accumulated experience of the law and its commentators. To bring together, in 1958, government officials and private citizens from sixteen countries for discussion in the United States with many of its leading anti-trust authorities was the imaginative plan of the University of Chicago's Graduate School of Business. The *Proceedings, International Conference on Control of Restrictive Business Practices* reprints the four public lectures, the eight country statements explaining their national policies, the summaries of the closed session discussions and the relevant legal enactments of eight countries and the Common Market.

The most striking feature of these reports is the similarity rather than the

difference in approach between countries. Although the presumption in favour of competition is stronger in some countries than in others, almost all place greater emphasis than in the United States on the *effects* of monopoly and restriction, and on the prevention of abuse. Most countries appear firmer in their legal attitude towards cartels, which are generally regarded as the main problem, than against concentration and monopoly; many countries felt that firms should be prevented from accomplishing the same ends by consolidation.

From the discussion there would appear to be three principal economic factors which affect the content of anti-trust legislation: the importance of international trade; the overall size of the economy; and the structure of the economy. Holland seemed to be a striking instance; the national income was less than the turnover of General Motors, and it exported over one-half of the national production. There " co-operation is the watchword," with the Government trying to modify cartels rather than destroy them. Unfortunately from the record it was difficult to form a view of the nature of causality or of the relative importance of these and other (generally more historical) factors, in part because, in reporting the proceedings of the discussion groups, identities of the speakers and the countries to which they were referring were concealed. No doubt this secrecy made for frank and useful discussion for the participants, but for the reader it reduces substantially the value of the book. Its principal value is as a work of reference for the anti-trust policies of a number of countries.

The only representative at the conference from Britain was Mr. R. L. Sich, the Registrar of Restrictive Trading Agreements. It was clear from his careful description of the 1956 British legislation that Mr. Guénault and Dr. Jackson are most misleading when they say that the development of anti-trust in Britain has been " diametrically opposed in character " to that in the United States. The similarities are far more striking. In the first book of its kind primarily about post-war British legislation, the authors, whose main interest is in the *control* of monopoly rather than the problem of monopoly itself, examine the background to the 1948 Monopolies and Restrictive Practices Act, the administration of the Monopolies Commission, its reports and the action taken, and finally examine the 1956 Act and experience with the first six judicial inquiries.

The discussion of British experience under the 1948 Act is presented clearly, and it provides a valuable record. They conclude that British legislation is even now less far-reaching than seems to be justified, and they attribute this to the urgent claims presented by other problems (nationalisation, balance of payments, defence) and, more convincingly, to the absence of any strong and continuing resentment against monopoly. The 1956 Act is seen as an " unimaginative and incomplete system of control," but they do not indicate the steps necessary to convert it into an imaginative and complete system (for which Kaysen and Turner would be recommended reading).

Two specific criticisms are that the 1956 Act does not advance towards dealing with the classical single-firm monopoly; but they do not discuss the more important problem of oligopoly, nor examine the use of control techniques, such as preventing mergers or splitting firms. And secondly, that resale-price-maintenance provisions may lead to rigidities in distribution and may be used to maintain the level of prices. They urge general prohibition of restrictive agreements with provision for exemption.

Since the authors wish to extend the area of control in Britain, it would have been sensible to examine whether experience in other countries, in particular the United States, was relevant. Indeed, the policy discussion is too much centred on the United Kingdon, with too little appreciation that British problems are not unique. Within these limits, however, the authors have provided a useful contribution to the literature of anti-trust control.

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Soviet Economic Warfare. By R. L. ALLEN. (Washington, D.C.: Public Affairs Press, 1960. Pp. x + 293. $5.)

Soviet Economic Power. By R. W. CAMPBELL. (London: Stevens, 1960. Pp. xii + 209. 30*s*.)

The Red Executive. By D. GRANICK. (London: Macmillan, 1960. Pp. 334. 21*s*.)

Soviet Statistics of Physical Output of Industrial Commodities. Their Compilation and Quality. By G. GROSSMAN. (Princeton, New Jersey: Princeton University Press (London: Oxford University Press, 1960. Pp. xiii + 151. 36*s*.)

The Soviet Seven Year Plan. With an introduction by A. NOVE. (London: Phoenix, 1960. Pp. 126. 10*s*. 6*d*.)

THE simultaneous appearance of four books by economists intended to explain to a wide, non-technical public the nature of Soviet competitiveness with the West seems testimony more to the political interest in co-existence than to general curiosity in how the Soviet economy operates. This is perhaps the conclusion to be drawn from the fact that rigorous standards of economic analysis are met by only two of the works comprised by the present review: that of Campbell, and that by Grossman, which examines the reliability of the Soviet statistics used to evaluate the competition.

Professor Grossman's scholarly and thoroughly documented study is the first of a series, to be published by the United States National Bureau of Economic Research, which the general editor, Professor Nutter, describes as focusing "on the economic performance of the Soviet Union as reflected in the statistical record." Formally the book is concerned only with data on the physical output of industrial products, and hence neither with other

commodities (in fact, Soviet agricultural statistics have presented greater problems of interpretation than those of the branch chosen) nor the aggregative series which are at the root of virtually all international comparisons. Actually, however, it raises the fundamental problem of the meaning of statistics for a market and a planned (" command ") economy. It was not part of his task to compare the Soviet with any other national system, but he registers the Soviet critique that capitalist statistics are affected by " the secretiveness of private firms, the lack of centralized co-ordination in and authority over the generation and collection of data," etc. (p. 22), as the obverse to his contention that " authority breeds deception and commands elicit simulation " (p. 4) and that the seller's market that has hitherto prevailed in the U.S.S.R. weakens checks by recipients on the quantity or quality of goods recorded in invoices. He observes that data reliability was once a dominant theme of the journal of the U.S.S.R. Central Statistical Administration but " after early 1953—that is after Stalin's death—the campaign as such virtually disappeared " (p. 51). Mr. Khrushchev's strictures on the falsification of reports at the Central Committee Plenum in January 1961 will no doubt renew it. He describes the forms of worker and management temptations to, and numerical and assortment distortions in, output reporting. As the direction (up or down) may vary with time and circumstance he gives little credence to Nove's " law of equal cheating."

Professor Grossman's account raises a question of the rationality of Soviet-type planning which would repay further study: must the reward of producers be measured by the degree of conformity with the plan? An alternative yardstick, in terms of past performance, adjusted, for instance, for increases in fixed assets, would cause any overstatement merely to diminish the reported change in the ensuing period, given that exaggerations could hardly " mushroom " for long. Briefly Professor Grossman's conclusion is that the published Soviet figures are the same (though subject to quotation in misleading contexts or in inadequate definition) as those used by the national authorities, and, although they may not always be perfectly accurate reflections of the event, " the relative magnitude of distortion is quite modest."

Professor Allen's book, on the other hand, examining trade rather than production statistics, states that " the inevitable conclusion is that these unexplained internal inconsistencies in the data go beyond the limits tolerated by accepted statistical publications " (p. 288). His main exhibit is the different percentage break-down of imports and exports in the 1955 and 1956 abstracts of the U.S.S.R. Ministry of Foreign Trade and of the Central Statistical Administration. The divergence—explained in the latter's abstracts published since Allen's project was completed—was attributable to the exclusion of some or all re-exports. The other exhibit—a random disparity between Soviet and their partners' returns—is at least partly misargued, because the assumption, correct for most countries, is made that

Soviet imports are valued c.i.f. whereas partners' exports are f.o.b. The Ministry of Trade abstracts in fact state that both imports and exports are f.o.b. (a concept of " frontier parity " now used throughout Eastern Europe).

Professor Allen's central thesis is that " the Soviet Union uses all of its foreign economic policies and relations consistently and exclusively to promote the interests of the Soviet state and the philosophy on which it is founded " and that its foreign economic relations represent no " mixture of contradictory interests . . . economic versus political and so on " and " except in the early years after the second world war . . . have become increasingly well-planned, coordinated and more effectively implemented " (pp. 3, 6). Only a few pages later, however, he alleges that Soviet policy-makers and economic agencies " are in constant conflict, with periodical pressure on operations from the former and emphasis upon Soviet immediate economic interests by the latter " (p. 18). He makes scant attempt to define " consistency " in foreign economic relations, apart from making the no longer novel point that during industrialisation the cost of capital goods has declined relatively to raw materials and that, since this is in line with the change in world terms of trade, a corresponding variation may be expected in Soviet commodity trade-patterns (p. 60). The advantage of a state trader is held to be equivalent to that of a monopolist enjoying market discrimination (p. 31), but no suggestion is made of limits placed by other competitors or of the possible ability of individual traders, by reason, say, of branding, to operate finer price differentials than a national sales board.

Professor Allen's argument runs on that a country practising " the comprehensive type of state trading . . . is necessarily and automatically engaging in economic warfare " because " a nation which has adopted state trading and which did not use it in the total interests of the state would be seriously remiss in its responsibility " (pp. 35–6). This *a priori* reasoning brings him to his desired syllogism: the U.S.S.R., being a state trader, is necessarily engaged in economic warfare. It would be tedious to list the book's errors of analysis, but an example is that overvaluation of the foreign-exchange rouble in relation to domestic prices results in a monetary *loss* by the trading agencies (p. 105). Internal contradictions abound—from the statements that Soviet purchasing " increases the market price " (p. 58) and " does not drive up the world price " (p. 170) to the use in Appendix D of a different transliteration of Cyrillic characters from that used in Appendix C for the same journal titles (in so far as system can be distinguished from the misprints). The confusion undoubtedly stems from the book's origin in papers by twenty-five participants in a project financed by the Dearborn Foundation, in which, as Professor Allen—the director of the project—naïvely reports in his preface, " each study was independently conducted without any attempt at correlation or collaboration with the other research." There is, however, a well-written chapter on Soviet participation in U.N. Technical Assistance (if it is shorn of the tail-piece entitled " Evaluation ") and the other com-

ponent studies—on trade organisation, on the direction and composition of trade and aid, and on the country's past and prospective growth—are reasonably competent, even if bettered elsewhere (Nove in *Trade with Communist Countries* on the first, various U.N. reports on the second and Campbell on the third).

A superior foil to Professor Campbell's book is the other multi-author work comprised in the present notice, *The Soviet Seven-Year Plan* (here abbreviated to *SYP*). Both include popular-language expositions of the Soviet economic mechanism and reviews of the Seven-Year Plan (1959–65), but in inverse proportions. The first devotes just six pages to the Plan and most of the others to the mechanism, while the second provides a dozen pages on the mechanism, with the rest on the Plan.

An analysis of the current Plan is central to study of " competitive coexistence ": *SYP* examines, in the light of trends in energy and steel consumption, the Soviet " claims that fulfilment of the 1965 plan will result in the U.S.S.R. producing more industrial goods per head of the population than are now produced in the U.K. or West Germany . . . and . . . that by 1970, or even earlier, the U.S. output per head will be surpassed " (pp. 110–12). Both *SYP* and Campbell find such claims exaggerated, but the latter points out that at the likely rates of industrial growth of " 3 per cent for the United States and 8 per cent for the Soviet Union, the catching-up period is . . . two decades " (p. 194). Professor Campbell proceeds from this to discuss comparative growth-rates of G.N.P.—" a growth of 5 per cent per year might be a reasonable projection for the future as against the 2·5 to 3 per cent that is considered the long-term prospect for our economy " (p. 196). Because at established prices the difference is small between shares of investment in the two G.N.P.s, he argues that different growth rates are attributable to a lower capital–output ratio and a higher share of net in gross investment in the U.S.S.R. than in the United States. *SYP* points out that at corresponding prices the Soviet investment share is enlarged (p. 25), but fails to seize upon capital productivity as the crucial problem of the Seven-Year Plan. The nearest it approaches the idea is that " although it is true that attention is now being focussed far more than hitherto on getting value for money invested, it is questionable whether the investment proposed now is much more realistic in relation to planned output than it was under the Sixth Five-Year Plan " (p. 44).

This is the authors' only reference to the capital–output ratio, and their section on investment (pp. 25–32) no more than accompanies the apposition of gross output and gross investment increments (in percentage terms over non-comparable periods—1965 over 1959 in the first case, the average of 1959–65 over that of 1952–58 in the second) with unsubstantiated interpretives. Thus, " investments in coal, oil and gas reflect the planned switch in the fuel balance . . . The large investment in oil is designed to match the planned doubling of output "; that in iron and steel " seems very large " and in

engineering " is not inconsistent with " plans for output. *SYP* is in fact mainly a sector-by-sector review of the Plan, following the order of the official *Plan Directives* so closely that it omits without noticing building materials from its industrial survey (the *Directives* tuck this sector into construction). The book limits its tools of analysis to simple time-series or comparisons with the defunct Sixth Five-Year Plan and, striving to be both popular and technical (in the sense of conversance with the technological sciences rather than with economics), is unlikely to satisfy the exigent reader of any discipline.

It is on this score that Campbell is especially successful. He aims at the intelligent general reader (like Granick, with the American business-man foremost in mind), but makes no sacrifice of his economist's tools. Those which are not intuitively perceptible—the index-number problem, factor substitution and efficiency, marxist usages—are explained simply, but without loss of precision: one envies his students at the University of Southern California. After a succinct historical introduction, he describes the performance of the Soviet economy in terms of growth and efficiency and analyses the rationality of planning and the planners' control over resources (including studies of innovation and of producers' motivation).

He points out that " the mechanics of the Soviet planning process have not been studied very carefully in this country and the details remain obscure," but draws a highly credible picture of the central formulation of highly aggregated plan magnitudes whose mutual consistency can be verified from experience and intuition. As these tentative targets are disaggregated for review at each operational level, some branches or commodities are more finely planned than others: he cites the central allocation of one to two thousand products and the system of " limits " for investment finance. He might also have mentioned in this context that a number of particularly large enterprises are similarly singled out for the central planning of their inputs and outputs. He describes the system of handing down targets and the return flow of comments upwards through the branch administrations —industrial ministries and *glavki*—and not until the following chapter does he briefly mention the liquidation of the pattern by the 1957 reform as having " some important implications for the effectiveness of planning and control, but obviously it in no way destroys the hierarchical structure described earlier " (p. 118) and in the rest of the chapter reverts to the ministerial paradigm. Not only would it have been more realistic to describe the Soviet system as it is, but some observations might have been modified—on the accordance of priority to chosen branches and on the built-in flexibility introduced by *glavki* setting targets for their enterprises which sum to more than the total required of the industry (pp. 95–7).

The observation of his Chapter 6, that " the Soviet approach to motivating management is strongly reminiscent of the approach by American corporations " (p. 115) is the theme of Granick's book (which, in addition,

discusses, as do Campbell and *SYP*, the comparative factors in Soviet and United States growth and, like Allen, economic competition for influence over the under-developed countries). Professor Granick gives more prominence to the sociological than to the economic aspects of comparison between managerial staffs in the U.S.S.R. and North America (with a few illuminating ideas on Britain—he was recently at Glasgow University) based for the former on a 1958 visit and the type of material used in his earlier book, *Management of the Industrial Firm in the U.S.S.R.* and Professor Berliner's brilliant *Factory and Manager in the U.S.S.R.* A 1936 survey of Soviet factory managers' parents shows, so far as the distinction between white and blue collar (or collarless) workers coincides with an American 1952 survey, much the same pattern as among U.S. executives (p. 54); more recent but less comprehensive data for the U.S.S.R. shows that although the pool of college graduates is proportionately smaller in the Soviet than in the American population, relatively many more managers in the U.S.S.R. have university training (p. 63), while the United Kingdom proportion is smaller than in either of those countries (p. 7). He goes beyond analysis by juxtaposition in his theory that the Communist Party imparts "the cloak of legitimacy" that the shareholder does to a management-run capitalist corporation. For each he weaves a scheme of similar functions in a managerial economy, but to the present reviewer the Party function in management is one of pressing executants to conform to the planners' (implicit or explicit) pattern of goals, and that, if a capitalist parallel must be drawn, it is better made with the investment banks that provided the risk-capital for Central European entrepreneurs (and indeed Russia under Tsar Nicholas II) than with the public shareholders who characterised American and British corporate development.

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Deposit Velocity and its Significance. By G. Garvy. (New York: Federal Reserve Bank of New York, 1959. Pp. 88. $0.60.)

The concept of velocity, which played so important a part in British monetary theory during the 1920s and early thirties, has received scant attention in the twenty-five years since the publication of *The General Theory*. The Radcliffe Committee dismiss it with the curt comment that, "we cannot find any reason for supposing or any experience in monetary history indicating, that there is any limit to the velocity of circulation; it is a statistical concept that tells us nothing directly of the motivation that influences the level of total demand." In America, too, the concept seemed to have little significance in the period of high liquidity and low and stable interest rates during and immediately after the War. With the

revival of flexible monetary policy, however, came a revival of interest in velocity, and it has clearly come to play, again, a significant part in the thinking of officials of the Federal Reserve System.

In this study Dr. Garvy is concerned mainly with the transactions velocity of demand deposits, though he also discusses the relationship between transactions and income velocity. There are brief chapters explaining definitions and techniques of measurement and presenting the statistical record of velocity since the end of the First World War. This leads to the main part of the study, which is an analysis in considerable detail of changes in the various factors which may affect velocity; these include the ownership of deposits; banking practice; the management of corporate and government cash balances; and the availability of and the attitude towards liquid assets other than money. This is an excellent example of the meticulous study and rigorous analysis of financial mechanisms, which the research staff of the Federal Reserve Bank of New York do so well, and which is so sadly lacking here.

Dr. Garvy shows that velocity nearly doubled between 1945 and 1958, and he explains this by reference to the increased speed of payments (for example the sending of cheques by air-mail); improvements in the technique of cash management; and the investment of "idle balances," stimulated by higher interest rates. Even so, however, velocity in 1958 was only about two-thirds of the peak reached in 1929. Dr. Garvy believes, however, that the figures for the 1920s were enhanced by errors of classification which recorded some demand deposits as time deposits; by the extent of financial speculation; and by the absence of the present practice of keeping "compensating balances" as an alternative to paying bank charges. Thus, while he foresees that continued improvements in techniques will gradually increase velocity, Dr. Garvy does not expect any quick return to the high figure of the 1920s.

In discussing the implications of changes in velocity for monetary policy, Dr. Garvy claims that, so far from being a hindrance, they are actually a help. "Frequently actions of the monetary authorities can be taken only in doses that are sufficiently massive to create temporary disturbances at their initial point of impact. . . . In such situations velocity acts as a shock absorber and helps to cushion and diffuse the initial effects of policy actions." This clearly implies that action to restrict the volume of money will produce an increase in velocity sufficient to "cushion and diffuse" its effects but not so great as to nullify them altogether. In the short-run at least there is a limit to velocity, and Dr. Garvy's conclusions are directly opposed to those of the Radcliffe Committee. Dr. Garvy's account of the institutional factors affecting velocity strongly suggests that there is a limit, in the sense of a point beyond which any further rise will, in the short-run, encounter rapidly increasing resistance. He does not explain, however, what happens to the pattern of interest rates and to the availability of

different types of loan when such a point is reached. Here there is room for further research both theoretical and empirical.

E. VICTOR MORGAN

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Population Redistribution and Economic Growth, United States 1870–1950. Volume II: Analyses of Economic Change. By S. KUZNETS, A. R. MILLER and R. A. EASTERLIN. (Philadelphia, Pennsylvania: The American Philosophical Society (104 South Fifth Street, Philadelphia 6), 1960. Pp. xiv + 289. $5.00.)

THIS is the second volume of an ambitious study carried out in the University of Pennsylvania under the direction of Professors Simon Kuznets and Dorothy Swaine Thomas. It contains monographs on "Labour Force Trends and Differentials" (by Ann Ratner Miller), "Redistribution of Manufacturing" and "Long Term Tendencies in the Regional Growth of Income" (by Richard A. Easterlin), with a synthesis by Professor Kuznets under the title "The Changing Distribution and Structure of Economic Activity." Using the statistical material for the period 1870–1950 set out in detail in Volume I published in 1957, the authors have aimed at an interpretation of what they call "a continuous chain of interdependent variables that have linked economic growth and population redistribution." An analysis of the role of internal migration and the interaction of demographic and economic factors will be given in the third and final volume.

Between 1880 and 1950 the labour force of the United States grew from 17 million to 60 million persons, the rate of increase ranging from 23% in Vermont to 3,000% in the state of Washington. The proportion of the labour force engaged in agriculture fell in this period from 49·4 to 11·4%, that in manufacturing went up from 13·5 to 25·3%, in trade and finance from 9·4 to 21·5%, and in services (other than private household) from 8·4 to 21·2%. This transformation is documented in tremendous detail for each state for census years for the period 1880–1950.

The authors are to be complimented on the efficient way in which they have organised and presented the results of their research. A text which distils the essence of 750 pages of statistical tables does not make easy reading, and one is apt to get bored by those parts which merely convey quantitative facts which have no bearing on any theme. It was inevitable that much of the elaborate pattern displayed in such detail in this volume should confirm what was known already. The analysis leaves no doubt about the fact that economic growth in the United States since 1870 has entailed a tendency towards equalisation of income per head in the various states. Professor Easterlin observes that this is in striking contrast to the trend which appears to have characterised the international scene. Interesting estimates of the volume of inter-regional flows of capital and labour are presented in support

of the conclusion that free movement of commodities within the United States could not by itself have brought about the tendency towards factor price equalisation. The attempt to measure inter-regional capital flows is commendable, but the data used (census information on the distribution of wealth among states) are, as Professor Easterlin admits, somewhat crude. It is to be hoped that Volume III, which will be devoted to a thorough analysis of internal migration, will include an adequate study of the volume and direction of inter-regional capital movements.

As one would expect, Professor Kuznets rounds off the volume with an illuminating final section. He shows that, with the decline in the agricultural segment of the total labour force, the absolute differences between "richer" and "poorer" states were bound to narrow. Moreover, the relative disparity in service income per worker between the agricultural and non-agricultural sectors also declined over time. The reduction in inequality in income per head among population in different states was mainly a reflection of these two trends.

This volume, together with the previous one, provides an invaluable basis for the empirical testing of certain hypotheses about the process of economic growth in the United States since 1870. In their interpretation the authors are inclined to restrict themselves to adjustments within the United States unrelated to the changing nexus between the American economy and the outside world, but in publishing their original data in full they have opened up interesting possibilities for further work on that aspect.

BRINLEY THOMAS

Cardiff.

The Steel Industry Wage Structure. A study of the joint union-management job evaluation program in the basic steel industry. By J. STIEBER. (Cambridge, Mass.: Harvard University Press, 1959 (London: Oxford University Press, 1960). Pp. xxiii + 380. 64*s*.)

WAGE "inequities"—widely different rates of pay for apparently similar jobs—were one of the most potent causes of unrest in the American steel industry for ten years after the beginning of organised collective bargaining in 1937. In 1947, however, the United States Steel Corporation entered into an agreement with the United Steelworkers of America to base the wage structures of its steelmaking subsidiaries on a system of job evaluation. Other firms followed suit, so that to-day the great majority of American steelworkers have had their wages regulated by this method for more than a decade. Despite our long traditions of national bargaining in Britain, none of our private industries can equal this achievement.

Professor Stieber's explanation of its adoption falls into two parts. First, it was not such a great change as might have been supposed, because there has been a "tendency towards uniformity of wage rates amongst steel

companies" since the late nineteenth century, related to the absence of price competition in the industry. Secondly, the system of job evaluation, known as the Co-operative Wage Study plan, differed from most other systems in at least one important respect. Every system relies on weights to determine the importance of each of the factors, such as experience, skill and danger, into which jobs are analysed. These weights usually reflect the predilections of the experts. The C.W.S. plan, however, relied upon an elaborate inquiry to discover what weighting would most nearly conform to the existing wage variations in the industry. The result, therefore, was to standardise the existing wage structure, and to promise less disturbance than any other method.

The outstanding contrast was a weighting of 52% for responsibility, compared with less than 25% in most other systems (which give most importance to skill). Professor Stieber argues that this is because job evaluation has hitherto been most widely applied in light industry. The discovery provides food for thought to those who argue that a national system of "fair" wages could be based on job evaluation.

A number of interesting points emerge from his full and careful account of the application of the plan and its consequences. Contrary to expectations, firms in which the work-study engineers conducted negotiations with the union showed more flexibility than those in which the experts exercised remote control over professional negotiators. There seems to be advantage in rubbing the noses of planners in the consequences of their plans. After the scheme had been applied to manual workers the two sides proposed to extend it to include salaried technical and clerical workers on the same basis as hourly rated employees. Despite the considerable increase in emoluments which would have accrued to them, these workers revealed such a strong attachment to their staff privileges that the proposal had to be abandoned.

Professor Stieber says little about the post-war strike record of the American steel industry. Indeed, he could claim that this was not part of his subject. But he might have speculated a little on the failure of this apparently excellent method of removing one of the most important causes of industrial strife to affect the industry's world pre-eminence in post-war figures of working days lost through disputes.

A second criticism of his study is that he makes few concessions to the reader. His book should be read by every student of industrial relations, so long as the student has three or four days to devote to mastering it. If his timetable is too tight for that, he may make something of it by starting with the useful summary at the end and working backwards.

H. A. Clegg

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Some Economic Aspects of the Bhakra Nangal Project. By K. N. Raj. (Bombay and London: Asia Publishing House, 1960. Pp. xii + 140. 28*s*.)

This is a most interesting and competent study of an investment project—no mean investment project, the highest dam in the world and thousands of miles of canals and electricity transmission at a cost of about £150 million. It has been building since 1947, and is still unfinished. Professor Raj's investigation dates back to 1954/55; but fortunately there is no great loss of interest, since the facts on which the project was based were then available; and probably another decade will elapse before the economic effects can be fully assessed. Nevertheless, it is a pity that publication has been so long delayed.

It opens with a sensible introductory discussion of investment criteria, on " shadow price " lines. Nothing now new is said, and the considerations involved are not put into the framework of a general model. The upshot—and I do not think any sensible discussion could arrive at any other upshot—is that the project-designers and decision-makers should take into consideration the facts that foreign exchange and capital are undervalued, that labour is overvalued and that financial returns are, for such a project, little indication of the benefit to be derived. There is no discussion of any formal way in which they can be taken into consideration; this is probably sensible too; they should just be kept in mind. In fact, they are usually ignored, even in the public sector, because economists are not brought into the planning process—or not at a sufficiently early stage.

In the chapter on the project design Professor Raj unfolds a series of fascinating problems. Bhakra Nangal is multi-purpose. But even leaving electricity aside, the problem of arriving at an optimum project is enormously complex. How big an area is to be irrigated and how intensively? How should the flow vary throughout the year? The answers determine the height of the dam, and depend on costs and on the value of the extra agricultural output. The later depends in turn on prices and crop patterns, and on complementary investment in fertilisers and other things, in such a complicated and partly unknown manner that, as Professor Raj shows in a later chapter, no quantitative estimate of the benefit could be made. Electricity greatly complicates the problem, for it competes for scarce water: an optimal flow for irrigation purposes severely limits the power available when irrigation is little needed; an optimal flow for electricity wastes potential irrigation water. Even without the irrigation complication, it is hard to know how much power to plan to instal. Enough for a peak load even if there would be only water to meet that load in exceptionally wet years? Enough transmission for a load which will exist only in ten years' time? What is the cost of alternative ways of meeting lesser loads in the meantime?

The best-considered answers clearly require a team of engineers, agronomists, operational researchers and economists—all geniuses. Although

Professor Raj does not say so, the impression one gets is that engineers tend to "solve" these problems by over-providing everything whenever possible. The Sutlej is being dammed to a height of 680 feet, giving a utilisable storage of 5·6 million acre feet. But the Sutlej will seldom fill it, only 4·6 million acre feet being available in an average year. The estimate of the supply required for the irrigation planned is 6·2 million acre feet, and canals are dug to deal with this. Supplementary projects to feed in other rivers may solve this latter contradiction. But the planned power installations will eventually reduce the useful irrigation water if reasonably fully used. Over 1 million kilowatts is planned. But such power is possible only when the reservoir is full. Maximum use with costless water depends on a very wet year, and the further coincidence of a peak demand for electricity and irrigation. As a firm peak load, less than ½ million kilowatts will be available. But it will be many years before such a load is required, in advance of which a very extensive transmission system, reaching to Delhi, has been built.

It is a weakness that Professor Raj does not make clear how far the possibility of feeding other rivers into the reservoir would reduce the over-provision otherwise indicated. Although this possibility was known, it did not form part of the project. Was it, then, an afterthought to rectify errors, or was it always in mind? Even if the latter, the strong suggestion remains that capital has been much too lavishly used. One wonders with concern what the capital/output ratio of the top 10 feet of the dam, and the last 100,000 kilowatts, can be.

Professor Raj also has a very interesting discussion of man-power use. Once the magnitude of the project was given, labour-intensive methods of building the dam and processing the materials became impossible. The narrowness of the site and the best quality of concrete and construction, essential for a high dam, meant that little labour and virtually no unskilled labour could be employed. It also implied a high foreign cost component. Labour, on any large scale, could be employed only to dig the canals.

Employment rose steadily to a peak of 120,000 in the spring of 1954, after which it fell precipitately as the main canals were finished. This labour force could not be recruited at the going wage for casual labour in the Punjab, without importing half from other States. The main reason for this was that the Punjab probably had the least underemployment of any State in India, the chief evidence of this being that it had the highest wage-rate (1.80 Rs. a day in 1954): about twice as high as other areas from which labour was recruited. Even then the intervention of labour sub-contractors, who paid part of the cost of moving and provided rudimentary housing, was required. Professor Raj argues that this is an inefficient and expensive method of overcoming immobility, for the reason that the contractors could offer only temporary employment, after which the labour had to find its way home. A centrally organised project-army could give more stable employment by moving men from project to project, and could thus reduce move-

ment costs, and avoid the need to pay high local wage-rates in areas with relatively little underemployment. One might add that large projects inevitably have a higher real labour cost than a greater number of smaller local projects employing as many men.

There is no doubt that economic studies of the type exemplified by Professor Raj's book should do much to improve project planning in underdeveloped areas. Admittedly, hunch is the inevitable method of answering many of the questions involved. But economists at least ask the right questions.

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Industrial Entrepreneurship in Madras State. By J. J. Berna. (Bombay and London: Asia Publishing House for the International Industrial Development Center, Stanford Research Institute, 1960. Pp. xvi + 239. 45*s*.)

The role of entrepreneurs in an economy undergoing development under the ægis of a planning authority is an important subject, of special relevance to India; and a work dealing with the attitude of entrepreneurs to problems of growth is, therefore, welcome. Mr. Berna has surveyed fifty-two firms employing between fifty and two hundred and fifty workers in the light engineering-manufacturing industries in and around the towns of Madras and Coimbatore. The study shows that only one-fifth of the entrepreneurs belong to the traditional commercial or artisan castes. As regards previous profession, the author states that, contrary to general opinion about merchants forming the bulk of entrepreneurs, he found that less than one-third had been merchants; among the rest the largest number are graduate engineers (twelve), and about an equal number (eleven) of rural artisans and factory workmen. In addition, there were ten entrepreneurs with heterogeneous background, including school teaching, white-collar jobs, landlords, priests and a Czech travelling saleman, who gave up service with a shoe company to undertake button manufacture. The large number of graduate engineers among the entrepreneurs is leading to quick technical improvements in the industries, and from the point of view of development prospects special significance has rightly been attached to this fact, both by the authors and Mr. Eugene Staley, the research leader of the Stanford Institute, in his foreword to this book. But one may mention that a closer look at Mr. Berna's tables reveals also the fact that since the start of the First Five Year Plan in 1951, only one graduate engineer seems to have established a firm, as against six merchants who have done so.

As regards sources of finance, the author found that the Government and the banks are unwilling to help except in rare cases. The collateral security demanded by the Government as well as the banks is large in

relation to the financial capacity of the entrepreneurs to furnish it. In the stray cases where the banks have helped, it is for providing short-term working capital. So the entrepreneurs had either previous property of their own or have had to borrow from their relatives, friends or moneylenders. However, most of the firms established by factory workmen and rural artisans were started at a very small scale with about eight workers or less and have grown on their own savings. Though the author has rightly extolled the possibility of firms growing in this way, it has led him to underrate the necessity of government action in removing finance as a bottleneck, through his suggesting that "shortage of capital can be a sign of poor management or lack of resourcefulness—rather than an independent cause of lack of growth."

These entrepreneurs find the greatest bottleneck to growth in the scarcity of raw materials. In consumption-goods manufacture, strangely enough, they do not complain much about shortage of raw materials, whereas the producer-goods firms seem to be facing great difficulties in obtaining steel and pig iron, nuts and bolts, spare parts of machinery, etc. In spite of this shortage of steel, in order to reduce dependence on other firms there is a tendency towards backward integration, and consequently excess capacity is commonly found. As the supply of raw materials grows, employment within a firm grows at a faster rate than investment. Mr. Berna's object did not include cost studies, hence rates of growth or capital–output ratios are not given.

In labour relations there is perennial tension between workers, with their low wages and poor working conditions, and the management, which usually fails to win the goodwill of workers. On the other hand, Mr. Berna considers some trade-union leaders to be agitators rather than bargainers. Government legislation protecting the worker is also considered by the author to be a hindrance to factory discipline.

The great hope for the future lies, however, in the keen desire among these entrepreneurs to acquire technical knowledge and to introduce improvements. If they could be assisted in this, then with gradual easing of the situation regarding the supply of steel and improvement in finance, Mr. Berna's study shows that the medium-scale entrepreneur will be able to fulfil his task in India's industrial expansion.

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Traffic and Transport in Nigeria. By G. WALKER. (London: H.M. Stationery Office, 1959. Pp. xiv + 319. 75*s.*)

IT was R. L. Stevenson who observed that "to travel hopefully is a better thing than to arrive, and the true success is to labour." While there is

plenty of evidence that Professor Walker has laboured—though not all the while in Nigeria—to produce a very informative book, it is also apparent that he has travelled a not inconsiderable distance without arriving at any systematic conclusions on matters of urgent public concern to people in Nigeria. Indeed, the reader deserves to be warned that the book contains 188 pages of somewhat rambling transport history followed by about 100 pages of heterogeneous statistical tables. Much of this is interesting and entertaining, but too little of it constitutes an exercise in economic analysis, and it is a disappointment that it is so many years out of date now for purposes of public policy.

Throughout the 1950s Nigeria has been spending relatively large sums of public money on a wide range of capital projects. Out of some £300 million appropriated for public works since 1954, more than a third has gone towards improving and extending the country's network of transport communications. While the term "cost–benefit ratio" may never have entered into the exchanges between advocates of highway construction, on the one hand, and those, on the other hand, who favour railway extensions, it is nevertheless true that controversy and debate over their respective priorities have made the planning of government's capital expenditures a very thorny assignment in Nigeria since the last war. This is as true now that the Nigerian Railway is being extended, with the aid of £10 million lent by the International Bank for Reconstruction and Development, several hundred miles to reach Maiduguri in the north-east of Nigeria as it was ten years ago. In fact, it was ten years ago very nearly that the Colonial Office and the Nigerian Government invited Professor Walker to "examine the transport system of Nigeria" and a year later, after he had paid two visits to the country, to "describe fully" what he had found. Whatever he may have reported verbally at that time on the road–rail controversy, and there were many officials in Nigeria who believed that Professor Walker had expressed very definite views on this matter, he has interpreted these "terms of reference" very differently in the published book. Indeed, one has to search diligently even to find a hint of the author's own point of view. At the end of a brief treatment of railway construction which he gives at the start of Chapter IV Professor Walker mentions the recommendations made in 1954 by the International Bank's Mission to Nigeria; and he goes on to point out that

> "200,000 tons of freight a year, 150,000 in the one direction, which is all the Mission can foresee at the end of twenty years amounts at ·56 of a (long) ton-mile to each traffic unit measured in metric-ton-kilometers, to just over 400,000 units a year. This is the minimum recommended to the Economic Commission for Europe by the railway experts 'for profitable operation of new railway lines'—hardly enough to warrant even in Nigeria the expense of constructing a railway."

Those who are sceptical about the benefits to be derived from the present

programme of railway development in Nigeria will be disappointed that this hint is not developed with any clear analysis to support their scepticism.

The value of the work lies rather in its description of the way in which Nigeria's transport system has grown up during the first half of this century. The book opens with a short account of the main streams of transport operating in 1950, to be followed by three substantive chapters tracing the evolution of port and inland water-carriage facilities, the railway and the road-haulage sectors. The textual part of the book ends with two chapters in which the author discusses the various statutory and advisory provisions that have been made from time to time to control competition and to regulate tariffs and charges obtaining by road, rail and water. Thereafter we have a mass of statistical tables, drawn from a wide number of sources, mostly official but some commercial and academic. While there are cross references in the text to much of this statistical material, it has not on the whole been fully assimilated into the book.

Students doing research into Nigerian transport problems will undoubtedly benefit a good deal from having a great amount of material collected and made available in one book. But it is a matter for regret that Professor Walker has not provided us with clearer conclusions about what he really found when visiting Nigeria.

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Migrants and Proletarians. Urban labour in the economic development of Uganda. By W. ELKAN. (London: Oxford University Press for the East African Institute of Social Research, 1960. Pp. x + 149. 21*s*.)

UGANDA's towns have been growing rapidly, but there have been few signs of the growth of an urban working class. There is a constant movement of labour into and out of the towns, and the urban labour force largely consists of temporary migrants. In this notably well-written book Dr. Elkan, formerly of Makerere College, Uganda, examines the causes and effects of a labour supply of this kind. He considers the labour market both from the demand and supply sides, the structure of wages, industrial relations and problems of management, and concludes with a chapter in which the reasons for the persistence of migrant labour are analysed. Most of the information on which the book is based was obtained from investigations carried out at industrial establishments in the three main towns of Uganda.

Dr. Elkan disclaims any intention of stating general laws of "labour force development." He is "content to do no more than 'describe' and to try to find reasons why things are the way he found them." In consequence, his book lacks a strong central argument upon which a reviewer can seize. One can do no more than refer to a few of the interesting topics discussed.

The nearest approach to a general theme is, perhaps, to be found in

the emphasis on diversity. Uganda has a population of less than 7 millions, but it is a land of many peoples. The diversity in tribal attitudes and attributes is very great. There are important differences in physique, in education and in economic opportunities in the various tribal districts. Dr. Elkan shows how these differences affect the occupations in which the different tribes are largely to be found, the structure of wages, the migratory character of the labour force and the character of the response to economic incentives. "The concept of *the* African worker is a myth." The existence of the Asian and European "tribes" further complicates the situation.

Although Dr. Elkan is intent on emphasising the dangers of facile generalisation, and the importance of taking account of the detailed circumstances, he does not abandon general economic reasoning. He does not postulate "non-economic man." Thus, he does not give much weight to anthropological explanations of the persistence of migratory labour as an initiation rite. These explanations, he argues, do not sufficiently account for the fact that the practice of seeking temporary employment is most deeply rooted in areas where alternative opportunities are least, and that "in some areas where the practice was at some time almost universal, the coming of alternative opportunities has caused it to melt away like snow."

Common assumptions about the limited wants of African workers, and their consequent lack of response to economic incentives, are also given short shrift. The view that the period of wage-earning is set by a target income, so that an increase in wage-rates will merely reduce the time worked, is not accepted. The fixed element in the situation is rather the length of time that can be spared from the farm. The reason is that the labourers "seek the fruits of their work in town not in the form of an immediate increase in consumption but rather in the higher yield of better equipped farms." For some workers, particularly the more permanent wage-earners, a very high overtime rate is needed to make them work longer hours. But the reason for this is found, not in a high preference for leisure, but in the fact that the workers often supplement their wage income by some form of "self-employment" which they would have to forgo if they worked overtime. On the other hand, short-term migrant workers, anxious to save as much as they can during their time in the town, are often willing to work longer hours at the standard-rate or even at less than the standard-rate.

Dr. Elkan's analytical arguments are not always easy to follow, possibly because of excessive compression. The effect on the level of wages of the fact that most workers have another source of income from their farm is not adequately dealt with. The arguments which turn on the distinction between skilled, semi-skilled and unskilled labour are by no means clear. The odd definitions of skilled and semi-skilled labour, in terms of the specificity of the skill, do not help matters. And the difficulty of measuring price changes when patterns of consumption are changing appears to be misunderstood.

References to English economic history are used with skill to throw light on the situation, and Dr. Elkan is adept at vividly expressing the peculiarities of local circumstances. He remarks that things such as light switches and brooms, " which in Britain are part of domestic as well as industrial life have to be met and mastered for the first time in the factory by African immigrant workers." And he points out that the respect which a chief's son still enjoys gives him some advantage as a factory supervisor, because " a man who gives orders must not feel that his house will be burnt down as a consequence."

ARTHUR HAZLEWOOD

Oxford.

A New Deal in Central Africa. Edited by C. LEYS and C. PRATT. (London : Heinemann, 1960. Pp. xiv + 226. 21*s*.)

PROFESSOR W. J. BARBER, of Wesleyan University, contributes two chapters on economic matters to this symposium on the Federation of Rhodesia and Nyasaland. The first deals with recent trends in the economy of the area and with the effects of federation. The usual arguments about the benefits of federation, which were so uncritically accepted by the Monckton Commission, are effectively demolished. Professor Barber sees the main cause of the post-federation economic growth as the continued exploitation of the natural resources of the area. Government protective policies are admitted to have helped, though Professor Barber is inclined to give too little weight to them.

There has been an improvement in the relative position of the African wage-earner, as compared with the European, because of an increase in the demand for labour not matched by a growth in the supply of labour coming forward from the indigenous economy. Professor Barber sees no need to modify this analysis in the light of the measures recently adopted in Southern Rhodesia to restrict the inflow of migrant labour. The restrictions, he argues, are merely designed to redirect labour from urban areas, where there is a temporary surplus, to the lower-paid jobs in European agriculture and in small-scale mining, where there is a chronic labour shortage.

The balance of forces in favour of the African wage-earner is delicately poised, Professor Barber suggests. It could be shifted the other way by increased mechanisation, which would raise the productivity and lower the cost of African labour, without fundamentally affecting its migrant, unskilled status, and which at the same time would provide more jobs for Europeans. The Government's industrialisation policy, Professor Barber believes, points to a development along these lines.

More convincing is the argument that the balance could be upset by a deterioration in the indigenous agricultural economy, which compelled more Africans to seek wage employment. Measures to stop the deteriora-

tion will have the same effect. It is a weakness of Professor Barber's discussion that he makes no mention of the Land Husbandry Act, for the existence of this Act reinforces his conclusions.

The second chapter is concerned with the redistributive effects of federation. Professor Barber makes some telling points. For example: " more is spent on education for a European population of less than 300,000 than on an African population of more than 7,300,000." And he is interesting on the regressive aspects of the fiscal system. On the other hand, he seriously under-estimates the extent of the fiscal redistribution in favour of Nyasaland. Even so, one might not disagree with his concluding remark that " there are good reasons to suppose that the interests of the two Rhodesias will continue to be dominant in the priorities of federal planning."

ARTHUR HAZLEWOOD

Oxford.

Charles Booth, Social Scientist. By T. S. SIMEY and M. B. SIMEY. (London: Oxford University Press, 1960. Pp. x + 282. 30*s*.)

CHARLES BOOTH richly deserves the re-assessment of his work provided in this careful and very readable biography. Although every text-book on English social and economic history for years past has referred to Booth's great survey as a landmark in the transition from the Victorian Age to the twentieth century—and the Welfare State—few people have troubled to find out what his survey was really like, and some rather hasty judgments have been passed upon it. It was his study of London poverty that made the greatest impact at the time and has had the most direct effect on subsequent research, but in fact it occupied only about a third of the time he devoted to the work. It is natural, but a pity, that future generations should have paid so little attention to the very substantial series of reports on industry and on religious and social influences. This is an error which Professor and Mrs. Simey are anxious to correct.

But their main purpose, apart from giving a convincing and most attractive portrait of this remarkable man, is to vindicate his reputation as a social scientist, or more precisely as a sociologist, as against the view that he was a laborious collector of facts, and nothing else. A reputation may rest on any or all of three things: originality, aim or aspiration, and performance. Booth was certainly original, in the sense that he was a pioneer. His claim rests on the combination of a scientific approach to social problems, which was not in itself original, with a plunge into the vortex of social-survey methods, which to a very large extent was. It is something of a paradox that, although the climate of opinion was ripe and, in a sense, waiting for Booth in the 1880s, he failed to get substantial support for his project and had few helpers to start with, apart from the devoted body of School Board Visitors

who provided his data. So his survey broke new ground. But the authors are probably right in saying that the most striking originality is found in the many remarkable insights he had into questions which were later studied as part of the sociology of industry and of religion. That his aims and aspirations were those of a sociologist is apparent in the whole story of his life's work and is manifested in many of his own statements. He and Beatrice Potter (Webb) discussed methods of "social diagnosis"; he looked explicitly for "causes"; and he wanted "a large statistical framework which is built to receive accumulations of facts out of which at last is evolved the theory and the law and the basis of more intelligent action." But it is the limitations of his performance that have tarnished his reputation. He achieved a survey of poverty, acclaimed as a masterpiece, but he did not fulfil his sociological aspirations. His work lacked conclusion, as was acutely felt by Alfred Marshall, who wrote, "but most of all do I yearn for the focusing in the last volume. To that you will of course give the very best of yourself." But the last volume was a failure as a conclusion, and Booth knew it.

Professor and Mrs. Simey write with enthusiasm, but with discrimination. They do not hesitate to point out the defects of Booth's work and his frequent failure to grasp the full significance of his own ideas and discoveries. Their final assessment is that "Booth was, in fact, a great sociologist rather than a great statistician." Subject to slight doubts about the first "great," this is true. His statistical methods were rudimentary, and became more so as the work progressed, but his inspiration and his patient methodical work as an observer—sometimes a "participant" one—were sociological. They go on to say, in repudiating a judgment of Beatrice Webb, that "his strongest claim to recognition as a scientist and sociologist . . . lay in the formulation of questions which could be answered by objective enquiry." This verdict is open to dispute. The fact is that his questions were not answered, and Beatrice Webb believed that this was because he proved unable to devise any scientific method by which they *could* be answered. Nevertheless, it is fair to say that he had real vision and that he stimulated others to do what he failed to achieve himself. His work was far from being a model; but it was certainly a challenge.

T. H. MARSHALL

Cambridge.

NOTES AND MEMORANDA

NOTES ON SOME CONTROVERSIES IN THE THEORY OF INTERNATIONAL TRADE: A COMMENT[1]

ONE had the impression in recent years that "elasticity pessimism" about foreign-exchange markets, after having filled so many pages during the post-war years, had died with a whimper. In a recent article, two well-known economists have attempted to resurrect one extreme form in which elasticity pessimism has manifested itself.[2] The proposition that an unstable equilibrium in a foreign-exchange market has to be bounded by stable equilibria, first stated by Milton Friedman[3] and, as the authors put it, "alleged to be proved" by me,[4] is said to involve a *non sequitur* which was "accepted as valid argument" because "the conclusion purportedly reached is of sufficient propaganda value."[5]

Contrary to the first impression the reader is liable to receive, the principal contention of Bhagwati and Johnson is *not* that there are no stable equilibria, but rather that these equilibria need not occur at *finite* (presumably positive) exchange rates.[6] I want to emphasise at the outset that what the authors choose to call the "propaganda value" of the argument does not at all depend on finiteness of the stable equilibria. But I am quite willing to plead guilty to the "fallacy" of considering only finite equilibria economically meaningful.

The focal point of the issue is revealed in Fig. 2 (*a*) of the Bhagwati–Johnson article.[7] Contrary to the authors' contention, neither Marshall nor anyone else would presumably ever have claimed that the demand for any commodity must always increase indefinitely as its relative price falls. The axes in Marshall's figures would have to extend to infinity if we wanted to verify the claim that his offer curves assumed insatiability.[8] The authors

[1] In preparing this comment, I have benefited from correspondence with Professor Milton Friedman. His disagreement with the article being reviewed does not necessarily imply agreement with the details of my criticism.

[2] J. Bhagwati and H. G. Johnson, "Notes on Some Controversies in the Theory of International Trade," ECONOMIC JOURNAL, Vol. LXX, March 1960, pp. 89–93.

[3] M. Friedman, "The Case for Flexible Exchange Rates," *Essays in Positive Economics* (University of Chicago Press, 1953), Chapter 6, p. 160, n. 4. The argument is already implied in Alfred Marshall's *Money, Credit and Commerce* (Macmillan, 1923), Appendix J.

[4] E. Sohmen, "Demand Elasticities and the Foreign-exchange Market," *Journal of Political Economy*, Vol. 65, October 1957, pp. 431–6.

[5] Bhagwati and Johnson, *op. cit.*, p. 93, n. 1.

[6] I follow the authors' assumption that the terms of trade and the exchange rate move in the same direction. Although this is not necessarily always correct, it will be in the neighbourhood of the limiting cases being discussed here.

[7] *Op. cit.*, p. 91.

[8] *Op. cit.*, p. 92.

do not seem to recognise that offer curves that fail to pass through the origin, but join the *export* axis at a finite distance from it are an entirely different proposition. It is easily shown that such offer curves belong to an economic never-never land.

The slope of a country's offer curve at the origin coincides with the slope of the trade-indifference curve through that point.[1] At the same time, this slope indicates the domestic price ratio between the two commodities in the absence of trade. If the offer curve does not pass through the origin at a finite positive angle, the relative and absolute price of the export commodity must be negative or zero under autarky. I am not sure whether Bhagwati and Johnson are prepared to join me in rejecting the possibility of a negative price. Coincidence of the offer curve with the export axis over a finite

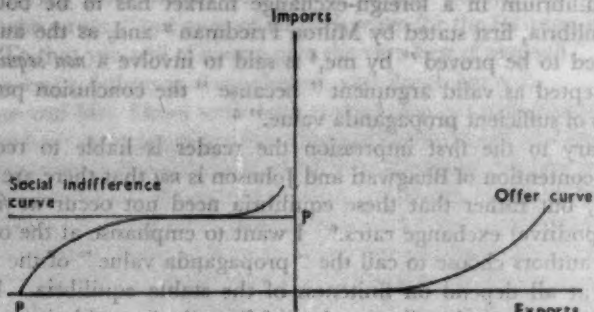

FIG. 1

range, the only remaining alternative and the one the authors apparently had in mind, implies that the *marginal cost of export commodities as well as their marginal utility for every single consumer is zero in the absence of trade and remains zero for a finite volume of trade.* Fig. 1 demonstrates this situation, the only one under which an infinitely depreciated currency *can* (not must) be a stable equilibrium.[2] If all potential export goods sell at positive prices under autarky, a finite stable equilibrium is guaranteed. But positive prices are not a *necessary* condition. A stable equilibrium at infinity would require that all export commodities remain free goods (*i.e.*, continue to be

[1] In the following, I rely on J. E. Meade's *Geometry of International Trade* (Allen & Unwin, London, 1952).

[2] The use of community indifference curves is open to serious objections. The reader may assume that the horizontal stretch tangential to the production block *PP* in Fig. 1 is part of a community indifference curve of the Scitovsky type, the only one free of metaphysical connotations. Although infinitely many Scitovsky indifference curves generally go through any given point, one for each distribution of real income, difficulties of this kind are not likely to arise in the relevant range in Fig. 1 (at least in the absence of major changes in the income distribution), since the marginal utility of consuming the export commodity is zero for *all* members of the community. See T. de Scitovsky, "A Reconsideration of the Theory of Tariffs," reprinted in the *Readings in the Theory of International Trade* (Blakiston, Philadelphia, 1950), pp. 358–89 and P. A. Samuelson, "Social Indifference Curves," *Quarterly Journal of Economics*, Vol. 70, February 1956, pp. 1–22.

produced at zero marginal cost) even after the demand of the rest of the world is fully satiated.

To be consistent, Bhagwati and Johnson should perhaps be prepared to argue that even more-than-infinite depreciation cannot be excluded on logical grounds. Negative exchange rates would indicate that export commodities are a positive nuisance for the residents of the country, of which to rid themselves they are prepared to pay foreigners a subsidy, and which are, in addition, producible at negative marginal (opportunity) cost. This as well as the case of infinite depreciation of a floating rate are *curiosa* of some pedagogical value, but do not seem to me to require empirical investigation before being rejected as possibilities in the real world. Bhagwati and Johnson take issue with this view.[1] One might be tempted to think that their criticism merely involves semantic hair-splitting if the somewhat unconventional tone of their article did not suggest that they believe to have detected a major error in logic. Evidence that the authors do not see the true nature of the limiting cases is their use of the irrelevant examples of "a bread-and-water economy or one relying on imports of raw materials not producible at home; on the other hand, the case of inferior goods."[2] In a prepublication draft of my note, perverted offer curves such as the ones exhibited in Fig. 2 (*a*) of the Bhagwati–Johnson article were shown, but with the intention of demonstrating the absurdity of an assumed exception to the central theorem.

The discussion above assumed substitutability in production and consumption.[3] In their subsequent "Reply," Bhagwati and Johnson make their whole case rest on the possibility of zero substitutability in *both*. To refute my contention that cases such as this belong to the realm of pure imagination, the authors will, among other things, have to provide an example of an economy that can produce only one rigidly fixed menu of commodities and services.[4] In the absence of such evidence, no recourse to any convention is needed according to which excess supply of a commodity at zero price would be regarded as a stable equilibrium.

The dichotomy between relative and absolute prices which is brought up in the "Reply" by Bhagwati and Johnson acquires some interest only in their freak case because the marginal costs of all commodities are zero up to the single attainable production point and infinite at that point, and because the same holds for marginal rates of substitution in consumption. Following accepted custom in theoretical discussion, marginal costs are understood to be defined as opportunity costs in terms of any other commodity; the introduction of currency units is entirely unnecessary.

[1] See especially the last paragraph of footnote 1, p. 93 of their article.

[2] *Op. cit.*, p. 92, n. 2.

[3] The following two paragraphs were added after I had read the "Reply" by the two authors.

[4] Let it be noted that this is not even a sufficient condition for the freak case to occur since lack of substitutability in production may be healed by substitutability in consumption. This is easily seen by appropriate modification of Fig. 1.

The importance of the issue extends considerably beyond the realm of narrow professional polemics. Bhagwati and Johnson are entirely silent on the principal conclusion I wanted to drive home. Since it is in danger of being overlooked, I would like to restate it here. All of the previous literature on the question of exchange-rate stability, with the sole exception of Professor Friedman's footnote cited above, fails to recognise the existence of the lower point of stable equilibrium (the one that would imply appreciation of the currency of the deficit country). Bhagwati and Johnson do not mention this all-important aspect for the hypothetical deficit country "suffering" from exchange-market instability. They concentrate exclusively on the alleged failure of reaching a stable equilibrium through *de*preciation. Even if the country could never "arrive" by "travelling hopefully" through less favourable exchange-rate values, it would inevitably benefit from *ap*preciation to the other stable equilibrium.

Let me stress again that it does not even matter for this purpose if there were indeed no stable equilibrium at *any* positive exchange rate. The deficit country would in that case be able to set the exchange rate at zero (or perhaps even at a negative value?). By hypothesis, it would be able to acquire all the imports it wants free of charge (or together with an extra bonus).[1]

My article was not intended to suggest that it would be easy for the authorities, given static instability, to *find* the exact value of the stable equilibria.[2] It should have been quite obvious that I did not want to give aid and comfort to the proponents of "adjustably pegged" exchange rates. My principal purpose was to destroy the generally accepted notion that a system of *freely fluctuating* rates might conceivably break down because of static instability and, by describing the exact nature of static instability, to throw doubt on the very possibility of its existence in the real world. I also did not suggest that the surplus countries will be content to cooperate in their own exploitation. On the contrary, I explicitly pointed out the likelihood of retaliation.[3] I accorded Professor Friedman pride of place for emphasising that a *stable equilibrium* can be attained through appreciation, realising full well that it had been recognised earlier that appreciation must improve the balance of trade if depreciation worsens it.

EGON SOHMEN

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and
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[1] See p. 435 of my note.
[2] This paragraph was added after I had read the authors' "Reply."
[3] *Op. cit.*, p. 436.

NOTES ON SOME CONTROVERSIES IN THE THEORY OF INTERNATIONAL TRADE: REJOINDER[a]

BEFORE we discuss the substantive issues raised by Mr. Sohmen we should like to point out some respects in which his *Comment* misrepresents or minunderstands our argument. Our article, as its title conveys, was concerned with a number of problems in the pure theory of international trade, of which the question of whether an unstable equilibrium is bounded by stable equilibria was only one. In examining that question we did not in any way commit ourselves to the support of "elasticity pessimism"—a term we did not use—unless allowing for the sake of argument the possibility of elasticities low enough to produce an unstable equilibrium is interpreted as support. (Nor do we think it relevant to ask, in examining the validity of an argument, whether the conclusions reached tend to support or refute policy views which are regarded as heretical, though we do regard this question as relevant to understanding why invalid arguments are accepted as valid.)[1] We showed that the proposition that an unstable equilibrium is bounded by stable equilibria is derived from offer curves the shapes of which assume that wants are both insatiable and terminable—we did not contend that Marshall, whose answers to unasked questions we do not pretend to know, believed that all wants are insatiable, but only that his offer curves assumed it.[b] We showed, further, that *both* satiability in one country and terminability in the other are necessary for the absence of a stable equilibrium. We described the proposition that an unstable equilibrium is always bounded by stable rates as fallacious, on the grounds that it does not hold in strict theory but requires an empirical assumption of insatiability or terminability to support it; whether this assumption is reasonable or not is a separate issue, empirical and not theoretical. We did not argue that the proposition involves a *non sequitur*, but only that Mr. Sohmen's alleged proof of it, which we dissected in our final footnote, does so.

We agree with Mr. Sohmen in regarding only finite equilibria as "economically meaningful," if that term is used in the sense of intelligibility to economists rather than as a synonym for "empirically possible," as Mr. Sohmen seems to intend it. It was on this assumption that we interpreted

[a] [To prevent this interchange from becoming too confusing for the reader, we have ignored Mr. Sohmen's comments on our Rejoinder, in our text. Our replies to these comments are contained in footnotes, enclosed in square brackets.]

[1] We should perhaps not have used the word "propaganda" in this connection, however, since to some casual readers of our footnote it seems to have conveyed an implication of deliberate deceit which was in no way intended.

[b] [This assumption is implied by Marshall's use of his offer curves to establish his proposition; the proposition implies that in every case the offer curves intersect in a stable equilibrium at finite prices, which in turn implies insatiability and terminability. Mr. Sohmen's contention that the axes in Marshall's figures would have to extend to infinity to verify this implication is quite erroneous, as should be evident from the fact that the quantity units along the axes are not specified, so that the effect of extending the axes to infinity can be deduced by assuming the units of quantity measured along these axes to increase indefinitely in size.]

the proposition under discussion to refer to finite stable equilibria,[1] and considered that we had refuted it by finding conditions under which no finite stable equilibrium existed. The substantive criticisms advanced in Mr. Sohmen's comment are that an infinite price of foreign exchange constitutes a stable equilibrium, so that we did not in fact disprove the proposition, but only proved that the stable equilibria might not occur at finite exchange rates; and that these infinite equilibria can be disregarded as belonging to "an economic never-never land."

As our diagrams showed, what occurs at an infinitely high price of imports is not necessarily an equilibrium, if that term means, as Mr. Sohmen seems to use it to mean, an intersection of the offer curves of the two countries: there is no reason why quantity demanded should not exceed quantity supplied at an infinite price.[2] Mr. Sohmen attempts to prove the contrary by arguing that the offer curve in this case coincides with the export axis, so that there must be an intersection of the two offer curves. But his argument depends on the use of social indifference curves and transformation curves, which are drawn to incorporate the substitutability between exports and imports in consumption and domestic production required to give the result he wants. There is no *a priori* reason why indifference curves and transformation curves should be drawn with these shapes;[3] there is no reason even for assuming that the curves themselves are a relevant tool of analysis, since exports and imports may not be substitutes in either domestic production or consumption—as in our example of a country relying on imports of raw materials not producible at home. Hence there is no reason why the offer curve cannot terminate at some point on the export axis, outside the terminal point of the foreign offer curve.[4]

[1] This interpretation is supported by the wording of Professor Friedman's footnote, cited by Sohmen, the relevant sentence of which reads:

> "As a purely theoretical matter, there will always be some set or sets of rates that will clear the market, and, in the neighborhood of at least one of these sets of rates a rise in the rate will mean a decline in excess demand (*i.e.*, a negative excess demand); a fall, a rise in excess demand."

While the first part of this sentence does not specifically exclude an infinite rate, neither does it suggest that an infinite rate is intended to be included; and the last part of the sentence is meaningless if applied to an infinite rate.

[2] We regard negative prices of exports as excluded by market mechanics; we cannot see how an infinite depreciation can turn into a negative price of the currency. But so far as we can tell, allowing for negative prices would not reverse the conclusions of our argument.

[3] For indifference curves incorporating the assumption that a good may become a positive nuisance, see, for example, Abba P. Lerner, "The Diagrammatical Representation of Demand Conditions in International Trade," *Economica*, N.S., Vol. I, No. 3 (August 1934), pp. 319–34, especially pp. 321–3; also F. H. Knight, "Realism and Relevance in the Theory of Demand," *Journal of Political Economy*, Vol. LII, No. 4 (December 1944), pp. 289–318, especially p. 291–3.

[4] It is easy to construct hypothetical examples in which only one, unstable intersection of the offer curves exists: as an illustration, suppose two countries, each of which produces a fixed quantity of a particular product and each of which consumes the two products in the fixed ratio of two domestic to one imported. [Contrary to the assertion of Mr. Sohmen's first added paragraph, our case does not rest on the possibility of zero substitutability in both consumption and production; it should be obvious from our exposition here and in our article that what is required is a sufficiently

We are prepared to concede to Mr. Sohmen, however, the existence of a convention in general equilibrium theory according to which an excess of quantity supplied over quantity demanded of a commodity at a zero price is regarded as a stable equilibrium, the commodity then being described as a free good.[a] If an infinitely high price of imports in terms of exports is inverted into a zero price of exports in the world market this convention can be applied to preserve the proposition that an unstable equilibrium must be surrounded by stable equilibria. Whether the convention should be so applied is debatable—an excess of saving over investment at a zero interest rate is not regarded as an equilibrium in Keynesian economics—and it reduces the proposition in effect to a tautology, but we would have no quarrel with anyone who asserted the proposition but made it clear that he was applying the convention. We suspect, however, that the persuasive power of the proposition as part of the case for flexible exchange rates would be somewhat reduced by the addition of the explanation " of course, when I say there always exists a stable equilibrium rate, I include the possibility that the currency may depreciate infinitely." We would also point out that the notion of free goods is an extremely treacherous one when applied to international trade, where the influence of prices on the welfare of people as producers, rather than as consumers, is often the important consideration.[b]

The dangers of applying the " free good " concept in international trade theory, and also of employing the indifference- and transformation-curve technique incautiously, are exemplified in Mr. Sohmen's attempt to show that the infinite import-price case belongs to an economic never-never land. It is quite invalid to infer from the fact that the *relative* price of exports in terms of imports is infinitely small that the *absolute* price, marginal utility and marginal cost of production are zero.[b] All three of the latter concepts

limited degree of substitutability, not zero substitutability. The illustration suggested in the first paragraph of this footnote abstracts from substitutability for simplicity only; but it has the virtue of focusing attention on the budget restraint from which Mr. Sohmen originally claimed to deduce his result, and showing that it is the presence of sufficient substitutability, and not the budget restraint, on which the existence of a finite stable equilibrium depends. This point is worth emphasising, since the erroneous notion that the budget restraint guarantees stability has been accepted from Mr. Sohmen by at least one subsequent writer, see Leland B. Yeager, " A Rehabilitation of Purchasing Power Parity," *Journal of Political Economy*, Vol. LXVI, No. 6, December 1958, pp. 516–30, esp. 527–9.]

[a] Cf. R. Dorfman, P. A. Samuelson and R. M. Solow, *Linear Programming and Economic Analysis*, (New York: McGraw-Hill Co., 1958), Chapter 13, Section 13.3, pp. 357–66, especially the careful discussion on pp. 357–61.

[b] [It is easy to be misled, as Mr. Sohmen earlier was, by the magic of the notion of " free goods " to the conclusion that a country is made better off when its exports become free good in the world market.]

[b] [It is news to us that it is " accepted custom in theoretical discussion " to confuse marginal cost and marginal utility with marginal rate of substitution in production and consumption respectively. If so, clarity would seem to demand explicit recognition of the fact that a ratio can fall either because the numerator becomes smaller or because the denominator becomes bigger, and that the economic implications are different in the two cases. Otherwise, errors are bound to result (see previous footnote). In any case, the relevance of the point is not confined to what Mr. Sohmen calls a " freak case."]

imply an independent unit of measurement—domestic currency or income units in the case of absolute price and marginal cost, "utils" in the case of marginal utility—in terms of which they will be positive and can be as "high" as one cares to think of: it is the infinite value of imports in these units that makes exports "free," a condition which implies extreme poverty and not, as the word "free" tends to suggest, super-abundance.

Whether the constellation of demand and supply conditions required to create the exceptional case could ever occur is, as we have stressed, an empirical question; our criticism of Mr. Sohmen was not directed at his empirical judgment but at his failure to acknowledge that he was using it. (We do not consider the contents of his pre-publication draft relevant evidence in this connection.) We would, however, point out that the argument of the foregoing paragraph shows our examples to be less irrelevant than he believes them to be; and also that a long list of eminent economists,[1] for whose empirical judgment we have some regard, have conspicuously not drawn comfort from the notion that there must be a stable equilibrium rate below an unstable one.

In his last two paragraphs Mr. Sohmen introduces an argument that it was no part of our purpose to discuss: that a country at an unstable equilibrium point could benefit by appreciating its currency. This argument he claims to have been overlooked by everyone but Professor Friedman and himself; actually it was first advanced by Professor Haberler[2] several years before it appeared in Professor Friedman's classic article. It seems to us less convincing than it does to Mr. Sohmen, who in the article to which we referred goes so far as to infer from it that an unstable equilibrium is an advantage to a deficit country. It assumes that the authorities know what the elasticities of international demand are, that they have sufficient foreign-exchange reserves to force the rate upwards against private speculation and that surplus countries (presumably armed with larger reserves) will be content to co-operate in their own exploitation; it also begs the question why countries in this eminently favourable situation should be advised to content themselves with an exchange-rate adjustment when other more potent means of exploiting the rest of the world are available.

JAGDISH BHAGWATI
HARRY G. JOHNSON

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[1] See Mr. Sohmen's article, n. 13, p. 435.

[2] See Gottfried Haberler, "Currency Depreciation and the International Monetary Fund," Chapter 21, pp. 384–96, in S. E. Harris, ed., *Foreign Economic Policy for the United States* (Cambridge: Harvard University Press, 1948), at the top of p. 393. [It is true that Haberler does not emphasise the *stability*, as contrasted with the *existence*, of the equilibrium attainable by appreciation, whereas Milton Friedman did, but it can hardly be supposed that Haberler thought that this equilibrium could be unstable, and stability seems to us clearly implied by his argument. In our opinion, this implication of stability is strong enough to cast doubt on Mr. Sohmen's sweeping charge that "all of the previous literature on the question of exchange-rate stability . . . fails to recognise the existence of the lower point of stable equilibrium." We shall not comment on the rest of Mr. Sohmen's additional paragraph, since the issues involved are extraneous to our original article.]

THE "ECONOMIC EFFICIENCY" OF TAXATION: A REJOINDER

In his note "Economic Efficiency of Taxation" (Economic Journal, September 1960, pp. 634–5), Mr. F. Livesey comments on my article "Is the 'Economic Efficiency' of Taxation Important?" To my mind, Mr. Livesey's points are based on a failure to distinguish between the analysis of the case for one individual and the case for the whole economy. Although in my article there is a complete distinction between the two cases, Mr. Livesey reproduces part of my argument for the case of one individual and confronts it with a quotation which deals with the economy as a whole. The case of one individual, it should be kept in mind, is a case where the tax is imposed only on that individual. This, admittedly rather uninteresting case, was included in my article only because it had been so common in much of the previous literature. For *that* case I assumed two taxes to be equivalent from the point of view of the government if they both reduce the individual's demand to the same extent. Naturally, the assumption of having the same effect on the price level has no relevance when the taxes are imposed only on one individual. Obviously, the price level for that individual is raised by any tax, partial or general, which raises some prices for him, and only for him. Taxes on one individual cannot, of course, have any effect on the general price level. Therefore, it is rather embarrassing to hear from Mr. Livesey that as the result of the taxes—on one individual only!—labour unions might be inclined to seek wage increases.

For the case of the economy as a whole economically equivalent taxes were *defined* by me as ones which have identical effects on the price level, so that Mr. Livesey's arguments do not hold at all. I did not state anywhere in my Economic Journal article that a sales tax is superior to an income tax on any grounds. As a matter of fact, in another article [1] I have tried to demonstrate that some arguments to the effect that outlay taxes are more deflationary than income taxes might be partly misleading. In that article I also argued that under the same monetary assumptions general income taxes and general outlay taxes (including, of course, general sales taxes) have almost [2] identical effects on the price level. Therefore it is difficult for me to accept Mr. Livesey's assumptions about the supposedly obvious effects of either tax on the price level. Truly, it is a legitimate and, I believe, an interesting problem, whether the location of taxes in the stream of payments affects some monetary decisions. But even if it does—and I

[1] "Deflationary Effects of Outlay and Income Taxes," *Journal of Political Economy*, June 1959, pp. 266–74.

[2] Some differences between the respective effects on the price level might be the result of different effects on the structure of payments.

hope to do some research on this problem—let us leave to the monetary factors results which are due to them.

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A CASE STUDY OF RESPONSE TO AGRICULTURAL PRICES IN COSTA RICA

"The extent of the response of agricultural producers in under-developed countries to changes in prices and price relationships bears on a wide range of issues. . . . Though certainly not unknown, situations exhibiting sharply the response of producers to change in an economic variable are infrequent, and have rarely been described." [1] The following example involves small farmers in an under-developed country who for the most part use traditional, non-mechanised techniques, rather than large-scale agriculture.[2]

In Costa Rica an agency called the Consejo Nacional de Producción has been setting minimum prices, announced in advance of planting, for the country's major food crops [3] since 1949. The minimum prices are enforced by the obligation of the Consejo to purchase whatever is offered to it by the producer, who resorts to the Consejo whenever he cannot get a better price in the local market. To illustrate the important role of the Consejo in the market, it bought in 1959/60 an estimated 24% of the national production of rice, about 10% of the harvest of corn and 29% of the beans marketed in the country. In a perfect market this would indicate that the minimum price was the effective price in the market (the supply curve would intersect the demand curve in its horizontal portion), but because of the geographical isolation of parts of the country it is possible that prices in some local markets exceed the minimum price for a greater or less period of time. The minimum prices for the three chief food products for the last twelve years are listed in Table I; actual market prices are not available, but, following the reasoning of the previous sentence, we may infer from Table II that only in beans in 1954–56 (when purchases of the Consejo were very small) was the market price apt to deviate widely from the minimum.

The two outstanding changes in price relationships shown in Table I are,

[1] P. T. Bauer and B. S. Yamey, "A Case Study of Response to Price in an Under-developed Country," Economic Journal, Vol. LXIX (December 1959), p. 800.

[2] 85% of the land devoted to corn is in farms of less than 2·5 hectares, 99% of the beans are grown on farms of less than 3·6 hectares and 80% of the rice comes from farms of less than 2 hectares. Proyecto de Investigacion del Desarrollo Economico de Costa Rica, *El Desarrollo Economico de Costa Rica, Estudio Numero 3: Sector Agropecuario de la Economia Costarricense* (Universidad de Costa Rica, San José, 1959), p. 75.

[3] Nearly all the corn is used for food. One of the goals of agricultural development work is to bring the cost of corn down enough to make it an animal feed.

TABLE I

Minimum Prices of Purchases by the Consejo Nacional de Producción, Rice, Corn and Beans, 1949–60

(Colones per quintal)

Product.	1949/50.	1950/51.	1951/52.	1952/53.	1953/54.	1954/55.	1955/56.	1956/57.	1957/58.	1958/59.	1959/60.	1960/61.
Rice * . . .	26·70	30·00	35·00	35·00	35·00	35·00	38·75	38·75	38·75	39·38	42·50	42·50
Corn † . . .	20·00	20·00	26·00	26·00	22·50	22·50	24·00	24·00	24·00	23·00	23·00	23·00
Beans: *												
Black . . .	44·00	40·00	46·00	46·00	45·00	45·00	45·00	45·00	45·00	50·00	50·00	50·0
Red . . .	44·00	40·00	48·00	48·00	45·00	45·00	50·00	50·00	50·00	55·00	55·00	55·00

* First quality.

† First quality. The same price was set for both white and yellow corn except in 1960/61, when the price for white corn was set at 22·00 colones per quintal.

Source: Data supplied by the Department of Economic Research, Consejo Nacional de Producción, Costa Rica.

TABLE II

Production, Imports and Purchases of the Consejo of Rice, Corn and Beans, 1949–60

(In 100 quintals)

Product.	1949/50.	1950/51.	1951/52.	1952/53.	1953/54.	1954/55.	1955/56.	1956/57.	1957/58.	1958/59.	1959/60.
Rice:											
Production . .	4,112	4,456	5,128	5,710	4,744	4,362	4,227	5,149	4,625	5,843	7,487
Imports . .	452	100	—	—	—	792	1,790	509	1,609	1,150	620
Purchases . .	212	305	478	1,453	392	502	708	1,145	443	379	1,791
Corn:											
Production . .	12,505	11,126	12,953	13,666	12,225	10,224	12,249	13,165	15,633	15,920	16,676
Imports . .	—	—	—	—	—	562	2,745	—	—	—	—
Purchases . .	502	413	1,820	2,341	346	371	397	441	1,080	1,822	1,682
Beans:											
Black—											
Production .	1,154	887	1,878	2,096	1,618	1,231	469	1,242	1,319	1,215	1,706
Purchases .	489	451	953	1,232	917	383	5	135	369	196	525
Red—											
Production .	1,166	1,305	1,393	1,543	1,455	1,115	641	1,670	1,795	1,800	2,440
Purchases .	175	86	277	393	283	11	—	112	222	52	650

Note: No data is given for imports of beans, which are negligible; indeed, a small quantity is exported about 50% of the time.
Source: Department of Economic Research, Consejo Nacional de Producción, Costa Rica.

first, the gradual rise in the price of rice relative to both corn and beans and of beans relative to corn, and, second, the jump to a higher price of red beans relative to black beans in 1955/56. The increase in the price of rice was motivated by a desire to reduce the dependence of Costa Rica on imports (see Table II). The decision to increase the price of red beans by 11% over the price of black beans was the result of the pattern of consumption, which favours red beans, and the accumulation of unsold surpluses of black beans by the Consejo.[1] The behaviour of production is shown in Table II.

The response in the case of beans seems clear and direct. In the six years 1949/50 to 1954/55, when the minimum prices of both red and black beans were nearly the same, the annual average production of black beans was 148,000 quintals and of red beans was 132,000 quintals. In the five years 1955/56 to 1959/60, after the increase in the minimum price of red beans, the annual average production of black beans was 119,000 quintals, while red beans increased to 167,000 quintals. In this case, the adjustments by the producer are particularly simple, involving only the planting of a different variety of seed.

In 1955/56 the minimum price of rice was raised after a four-year period of stability. The annual average output for the six preceding years was 475,000 quintals; for the five years following, it increased to 547,000 quintals.[2] This performance is not simply a movement along the supply curve, for a good deal of development work is being done by various agencies in rice cultivation.[3]

The price of corn has been raised and lowered several times within a fairly narrow range; of particular interest is the fact that in the last three years output has grown each year in the face of a cut in the minimum price. Development work in seeds, insecticides and fertiliser is being carried on in corn, so that here too there is a shift of the supply curve. While exact figures cannot be provided until the next agricultural census, the general pattern is for an increase in the acreage devoted to corn on the Atlantic coast of Costa Rica as a result of a loss of employment and income in the abacá plantations and in cacao production, which forced the planting of more corn as an income supplement. On the Pacific coast, where 60% of the country's total area devoted to corn is grown in conditions similar to those of rice, there has been a marked increase in the area under rice cultivation accompanied by a fall in the amount of corn planted. It is possible that this change was influenced by the changed pattern of relative prices, although some authorities state that it is to be attributed principally to losses in corn occasioned by unfavourable environmental conditions.[4]

[1] On July 31, 1955, the Consejo held 84,346 quintals of black beans and 4 quintals of red beans.

[2] Eliminating the bumper crop of 1959/60, the annual average for the four years following was 496,000 quintals, still showing an increase.

[3] *El Desarrollo Economico de Costa Rica, Estudio Numero 3*, pp. 21–2.

[4] *Ibid.*, p. 75.

In conclusion, the response to price seems clear in the case of beans, reasonably clear in rice and mixed with other factors in the case of corn.

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EXPORT PROSPECTS AND ECONOMIC GROWTH: INDIA: A COMMENT

IN a recent article, Dr. S. J. Patel[1] evaluates the probable future behaviour of India's foreign exchange earnings on merchandise account, arrives at rather pessimistic conclusions, and from these estimates concludes that correct investment allocation in India (and probably in other underdeveloped countries) must be slanted heavily toward increasing capacity in import-competing industries, particularly those producing capital goods. In his own words,

> "... the inevitable implication of the stagnation of exports and hence import capacity is that an adequate flow of capital-goods for investment cannot be assured without a much faster development of the heavy industries than any other sector of the economy for some years to come ..." [2]

As Patel himself recognises, the policy implications of his argument (though not the premises on which it rests) are similar to those advanced by politicians and economists in many underdeveloped countries, and the argument itself is one of the implicit premises of the Mahalanobis model upon which the investment allocation of the Indian Second Five Year Plan was formed.[3]

Because of the crucial importance of the policy implications of this view, it is imperative that the premises on which the conclusions rest be carefully examined.

Dr. Patel uses the Indian export experience and prospects as his basic frame of reference, and from his pessimistic conclusions in this context hypothesises that the situation may not be very different in other underdeveloped countries. He recognises, of course, that this argument, if

[1] S. J. Patel, "Export Prospects and Economic Growth: India," this JOURNAL, September 1959, pp. 496–506.

[2] *Ibid.*, p. 506.

[3] P. C. Mahalanobis, "The Approach of Operational Research to Planning in India," and the *Plan-Frame*, both in *Sankhya*, December 1955. See also, "Some Observations on the Growth of National Income," *Sankhya*, 1953. Mahalanobis assumes in formulating his model that all investment goods must originate in domestic industry. For a theoretical critique of this view, see M. Bronfenbrenner, "A Simplified Mahalanobis Development Model," *Economic Development and Cultural Change*, forthcoming.

correct, is extremely damaging to the view that development can be aided by expanding international trade in the early stages of growth.[1]

This note will first consider the degree to which Dr. Patel's conclusions with regard to Indian export prospects can be accepted, and secondly, the extent to which the investment policies with regard to heavy industry are the logical outgrowth of his conclusions.

I. Indian Export Prospects

Dr. Patel's case that India's exports are, and will remain, stagnant, is based on his contention that world demand for products exported by India is unlikely to grow significantly, and that it has been world demand, rather than Indian supply elasticities, that limited India's exports in the past.

He bases his argument, first, on the course of India's total exports from 1929 to 1956, and secondly, on his brief consideration of the probable future trend in world demand for the major products exported by India. We start with consideration of these two factors, and then consider other influences operative over the period in question that explain the pattern of Indian exports, *i.e.*, Indian government policies and domestic supply elasticities.

Dr. Patel's first line of argument, *i.e.*, that India's exports have been totally stagnant from 1929 to 1956, is, of course, correct in total. If one raises the question, however, as to what relevance a "trend" calculated over these diverse years has, it is difficult to see that any comparison of these two periods has significance. Quite aside from the structural shifts in the Indian economy due to depression, war, post-war inflation, independence, partition and planning, which more than override any underlying "trend" that might otherwise be in evidence, it is generally accepted even in India that the Indian economy has been stagnant, and that the fundamental task of planning is to generate a process of self-sustained growth in the Indian economy. That exports should be expected to have been expanding in an otherwise static economy is rather surprising!

In considering the major components of India's exports, Dr. Patel's conclusions are subject to considerable question. Dr. Patel first evaluates factors influencing long-term prospects for jute. While his data do not entirely support his contentions, it is probable that world demand for jute will not rise very rapidly in the future.[2]

With regard to tea, Dr. Patel uses data that indicate that tea "output in India has increased considerably faster than exports,"[3] and from this infers

[1] Patel, *op. cit.*, p. 506.

[2] N. K. Choudhry, "An Econometric Analysis of the Import Demand Function for Burlap (Hessian) in the U.S.A. 1919–53," *Econometrica*, Vol. 26, No. 3 (July 1958), especially pp. 416–18. In this regard, it is interesting that the Indian Government, on the one hand, claims foreign competition and substitute commodities are responsible for the "declining market," yet has only slowly reduced the export duty on jute and jute products.

[3] Patel, *op. cit.*, p. 495.

that world demand, rather than Indian supply factors, has been responsible for limiting the expansion of Indian tea exports. The trouble with this conclusion, of course, is that an increasing volume of tea "absorbed" in India proves nothing. The price of tea has fluctuated widely over the period, so that internal increases in tea "absorption" cannot have been the result of declining price. Additionally, there is some evidence to support the view that the total Indian tea supply may be highly inelastic, as suggested by the fact that the total area under tea cultivation has not changed significantly in the post-war period despite pronounced price swings over several-year periods.[1] In sum, there is as much evidence in support of several alternate hypotheses with regard to the demand for tea as there is for Patel's. Certainly, a considerably more exhaustive examination of the nature of demand would be required before any conclusion could be reached that India's tea-export prospects are as limited as Dr. Patel's estimates would indicate.

Dr. Patel's conclusions are most dubious with regard to his examination of cotton textile exports. His proof of the demand limitation for Indian exports consists of the fact that exports as a percentage of Indian textile output fell from 30% in 1950 to 14% in 1956.[2] In actual fact, the Indian Planning commission did not consider Indian export prospects exhaustively in the First Plan, but did plan on a decline in the value of cotton-textile exports because of the anticipated increase in domestic demand during the period.[3] Moreover, the Government has purposely diverted production into cottage industry and away from the more efficient (at existing prices) factory industry, preventing the introduction of automatic looms and other cost-reducing devices, thereby impeding the ability of the textile producers to compete on world markets. There is also a rather high tax on factory production of cotton textiles, and additionally, an export duty.[4] The Planning Commission itself defended its failure to attempt to increase exports more during the Second Plan period on the ground that domestic demand was rapidly increasing.[5]

Thus, in two of the four export products that Patel examines [6] there is

[1] Government of India, *Statistical Abstract, India*, 1955–56, p. 480. Noteworthy in this connection is that in neither Plan did the Government plan or attempt any measures that might increase tea output or exports.

[2] Patel, *op. cit.*, p. 496. Actually, it fell from 30 to 19% from 1950 to 1951, and fell another 4% from 1951 to 1956.

[3] *First Five Year Plan*, p. 68. The actual decline in the value of cotton textile exports was only 56% of the anticipated decline. See *First Plan*, p. 68, for planned figures, *Monthly Abstract of Statistics*, November 1958, for actual figures.

[4] K. K. Dewitt and G. C. Singh, *Indian Economics*, Chapter XXX. The tax and export duties have been lowered throughout the 1950s. See, Ministry of Information, *India, 1959*, p. 320, and G. Rosen, *Industrial Change in India*, pp. 38–42 (Glencoe, Illinois: Free Press, 1958).

[5] Planning Commission, *Second Five Year Plan*, p. 97.

[6] The last of the four export items that Patel reviews is groundnut oil. This is the least important of the four commodities reviewed, accounting for less than 2% of India's export earnings in 1956. Additionally, Dr. Patel himself recognises that there may be scope for expansion in this area. For data, see *Statistical Abstract*, 1955–56, pp. 809 and 811.

considerable evidence at least to cast doubt upon his assertion that it is foreign demand that has and will limit the growth of India's exports.

II. Alternate Hypotheses

Given, then, that the outlook may not be nearly so black for India's products as Dr. Patel would paint it, the present author believes that the past behaviour of Indian exports can be more than adequately explained by the policies of the Government of India and the Planning Commission, combined with internal demand and supply factors within India.

Consider first the behaviour of the Indian Planning Commission, and the underlying attitude toward exports referred to above. In neither of the two Five Year Plans has the Planning Commission seriously considered investment in export industries; indeed, in both Plans it was explicitly stated that a large deficit was anticipated on foreign account and that export increases would be small.[1] In these circumstances it is rather difficult to accept Dr. Patel's rationalisation that the low targets set for Indian exports in the Second Plan were due to the "poor performance" given by exports in the First Plan.[2]

Indeed, it is ironic that in a country where the Planning Commission has largely determined the allocation of resources and has so totally neglected investment in export industries, that the failure of exports to increase should then be used as a basis for the argument that they will not increase and that therefore import-competing industries should be developed! During the First Plan period the Indian payments situation was much more comfortable than had been anticipated by the Planners; in all years after planning started, until the strong inflationary pressures of 1957–58, exports were well above the planned level.[3]

Additional support to the view that Government policy rather than world demand has been the dominating factor in limiting the growth of Indian exports is given by the fact that the Indian balance of payments on private account has remained in approximate balance with the single exception of 1956–57, when a spurt of capital-goods imports on private account occurred.[4] Although part of the explanation of this lies in Indian import licensing patterns, the imbalance in Indian accounts has occurred primarily because of the very large volume of Government imports. The significant feature in this regard is not that the imbalance occurred, but rather that the Indian Government planned extremely large increases in the

[1] *First Five Year Plan*, p. 68, and *Second Five Year Plan*, p. 97.

[2] In this regard, see A. Krueger and N. K. Choudhry, "The Indian Payments Crisis," *Indian Economic Journal*, forthcoming.

[3] See National Council of Applied Economic Research, "Foreign Exchange Crisis and the Plan," *Occasional Paper No. 2* (New Delhi, 1957), pp. 8–9.

[4] See National Council of Applied Economic Research, "Foreign Exchange Crisis and the Plan," *Occasional Paper No. 1* (New Delhi, 1957), pp. 13–16.

import level for government purchases, without attempting any simultaneous measures of export promotion.

In addition to the hypothesis that Government policy, rather than world demand, has dominated the pattern of Indian exports, the Indian experience in the past few years has tended to indicate that the supply of exportable goods may fall off considerably with rising domestic demand. This view is given ample support by the Planning Commission itself, and was used to justify the Commission's failure to plan any substantial increases in exports. More important, however, is the recent decline in exports, which seems to have occurred at least partially as a result of the rising price level within India consequent on the strain imposed by the level of expenditures in the Second Plan. Dr. Patel interprets this absolute decline in the level of exports as indicative of the unfavourable prospects for Indian exports in the future;[1] it rather seems to have been the combined result of Government policy, a rising Indian price level, and the world recession of that year.[2]

III. Implications for Investment Policy

Although the above is far too superficial to support conclusively any specific interpretation of the Indian export experience, enough has been said to cast considerable doubt on Dr. Patel's interpretation of that experience. There is considerable basis for the contention that there are one or more other factors in the explanation of Indian export behaviour that are, on the surface, as satisfactory (if not more so) than that given by Dr. Patel.

It is not the purpose of this note to formulate a model of Indian export behaviour. It is intended, however, to raise serious questions with regard to the investment implications drawn by Dr. Patel and the Planning Commission, particularly with regard to the role of the foreign sector in development. Strangely enough, no Indian economist has ever questioned the desirability of foreign-produced capital goods for use in India. There has simply been a failure to allocate funds to the development of Indian exports.

The difficulties faced by India as she attempts to raise incomes are well known, particularly with regard to increasing the volume of investment. Since the capital-goods import-competing industries are generally those that require large amounts of India's scarcest factors (skilled technicians, large amounts of social overhead services, heavy imports per unit of investment, managerial ability) and relatively little of her abundant factors (particularly unskilled labour, small-scale organisations and underutilised

[1] Patel, *op. cit.*, p. 497.

[2] It is noteworthy in this regard that the latest quarterly figures indicate that private exports in both the first and second quarters of 1959 were above their 1958 levels for the comparable period. See Reserve Bank of India, *Bulletin*, October 1959, p. 1395, for the 1959 figures; January 1959, p. 147, for comparisons. Coincidentally, the world recession had ended, and the rate of increase in Indian prices diminished virtually to zero. Meanwhile, of course, the Government had started various export promotion schemes and relaxed export restrictions. See *Currency and Finance*, 1958–59, pp. 80–3.

rural resources), it certainly would appear that a considerably more thorough consideration of the potentialities of expanding exports (and thereby earning investment goods) as a possible investment alternative with extremely high returns should be made, and that the decision as to what import-competing industries should be developed should be considered in much greater detail than does Dr. Patel or the Planning Commission. Even if it were true that India's present exports could not expand, it would not necessarily follow that other export products could not be developed, or that the capital-goods import-competing industries should all be developed simultaneously. In this regard, food is an important Indian import that has led to many of the payments difficulties experienced since Independence. Additionally, India's improved prospect for foreign aid in the next decade raises further questions as to whether great emphasis must be placed on the rapid development of heavy industry.[1]

The point here is simply that very few Indians have examined the possibility of expanding exports as a means of raising national income with the same intensity of effort that they have considered other investment patterns. Export promotion measures have been undertaken only on a piecemeal basis since the payments crisis of 1956–58, and no concerted long-term export development measures have been taken.

The Indian argument, as expressed by Dr. Patel, that there is only a small segment of Indian exports that are "dynamic," would appear more impressive were it not for the fact that the same is true of the total output of any underdeveloped country; in the Indian case 63% of Indian investment is directed toward government enterprises that produce only 5% of Indian output (and an even smaller percentage of Indian exports).

In closing, it may be pointed out that there is a "structural" difficulty underlying Indian investment allocation, both in regard to export versus import-competing products, and also more generally with regard to allocation between the private and the public sectors. The fact that the Planners have direct control and decision-making ability over the public enterprises within the Indian economy, while they must use more indirect methods of influencing decisions within the private sector, combined with the political inclination of the people, has led to a strong preference for investment in the public sector of the economy. Yet the industries and enterprises within the public sector are generally those large-scale capital-intensive projects that are import-competing, once the social overhead industries are accounted for. To date, the private sector has met and overfulfilled its targets, while public-sector projects have generally cost more and yielded less than the Commission estimates. Indeed, the interesting phenomenon is that, cut off as the private sector has been from funds, private-sector performance has

[1] It is obvious that in the course of development many of these industries will be developed. This writer's quarrel is only with the degree of emphasis given to the introduction of these industries in the early stage of development.

been as good as it has. The long-term prospects for Indian development may well hinge on the degree to which democratic planning can allocate resources between the two sectors without this strong "bias" by type of industry. Seen in this context, Indian exports are only one aspect of the larger problems in Indian development.

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A NOTE ON THE CAPACITY TO IMPORT AND ECONOMIC DEVELOPMENT

1. IT is often argued in the current literature that a limited capacity to import is a special factor obstructing economic development, additional to and distinct from a low productivity of resources, that is a limited capacity to produce; and that therefore developing under-developed countries are bound to run into serious or even crippling balance-of-payments difficulties. An interesting expression of this influential point of view is Dr. S. J. Patel's article in the ECONOMIC JOURNAL of September 1959.[1]

Dr. Patel's primary concern is with India, but he considers that his analysis and policy conclusions apply generally to under-developed countries. In the ECONOMIC JOURNAL for September 1960 Dr. Kreuger examined some of Dr. Patel's arguments which apply specially to India.[2] The present note deals with the more general aspects and implications of Dr. Patel's reasoning, which reflects a widely adopted approach in the current literature on under-developed countries, especially in the fields of international trade, deficit financing and certain types of development planning. Paragraphs 2–6 of the present note take Dr. Patel's argument as a starting-point for a more general discussion; paragraphs 7, 8 and 9 are entirely in general terms.

2. Dr. Patel regards the stagnation of exports, in conjunction with the rapidly rising import requirements (which he considers as a corollary of development efforts), both as an obstacle to economic development in India and elsewhere, and also as the cause of the recent Indian exchange crisis. The stagnant exports, in turn, are said to reflect the stagnation of demand for these exports by private-enterprise companies. The argument is supported by reference to the stagnant volume of exports from South Asia, especially India, to the West. Moreover, according to Dr. Patel, the increase in the domestic output of the principal Indian export products, and also the response of jute exports to the Korean boom, show that the stagna-

[1] "Export Prospects and Economic Growth: India."
[2] "Export Prospects and Economic Growth: India: a Comment."

tion of the volume of exports reflects stagnation, or even saturation, of demand. To quote:

> "The brief review of the four major commodities that figure in India's exports indicates that in all cases domestic supply has increased and can be increased even more over a period of time if there was an adequate demand" (p. 496).

3. This reasoning identifies changes in supply from a particular source with changes in the conditions of demand. Yet changes in the volume of exports from one country are quite different from changes in the conditions of demand for the goods in question in international markets. Most of Dr. Patel's presentation fails to make the distinction between demand and supply, and between world exports and exports from one country. It further neglects the effects of prices on the quantities demanded, as well as the effects of the level of internal demand both on the volume of imports and on the conditions of supply of exports.

4. Indian exports, which are largely or wholly standardised products, are only part of the world exports of these commodities, and, of course, an even smaller part of total supply. Hence, even if world consumption of these commodities had remained constant, or declined, it would be invalid to conclude that the market for Indian exports is saturated. On Dr. Patel's own showing (p. 496), Indian exports of groundnuts are only about 12% of world exports, and only about 2% of world production, and they are an even much smaller proportion of world exports and production of all oils and oil-seeds which are largely substitutable. And production and consumption of oils and oil-seeds have increased greatly in recent years and decades. Indian exports of groundnuts have declined in recent years because larger supplies have been diverted to internal consumption. Substantially the same argument applies to some of the other major Indian exports.[1]

Dr. Patel instances the decline of exports relatively to domestic sales in India in support of the argument that exports have been limited by foreign demand. But this demonstration is irrelevant, since it ignores both the level of internal demand, and the prices at which Indian export products have been available for export. Information on the relative share of Indian exports in world exports of particular commodities would have been more nearly relevant. If this share had increased in a constant or declining total volume of world exports, this would more nearly support his thesis. In fact, this information has not been produced. The actual development has

[1] Dr. Patel does not discuss the effects of price changes on the quantities demanded, and thus does not consider the elasticity of demand for Indian exports. For several of these the (price) elasticity of demand is necessarily large. The elasticity of demand for the exports of one country depends on the elasticity of demand for the product as a whole, the share of the particular country in world exports and the elasticity of supply from rival sources, including home production in importing countries.

been the opposite; there has been an increase in the volume of world exports of these commodities with a decline in India's share.

5. The Indian exchange crisis was essentially independent of the level of demand for Indian exports. It resulted principally from the massive deficit finance [1] of the Second Five-Year Plan. Dr. Patel himself writes that between 1950 and 1956 Indian export earnings paid for 90% of imports, whilst since 1956 (the beginning of the Second Five-Year Plan) the proportion has declined to two-thirds. This drastic change was not the result of any long-term trend in export demand,[2] but of the large-scale deficit finance (creation of money) of the Second Plan.

In an open system with a fixed exchange rate, large-scale money creation tends to set up a deficit in external payments by increasing the money demand for goods and services, including both imports and also potential exports, without a corresponding increase in output (save in certain conditions of general unemployment of resources inapplicable to India). By putting pressure on domestic prices, the process further discourages exports and attracts additional imports, thus increasing further the payments deficit. These results would not follow if the money creation did not exceed the amount necessary to finance expansion of output at stable prices; Indian deficit finance far exceeded this in recent years. The foreign-exchange gap reflects a shortfall in real resources, of which the deficit finance is another manifestation. It reflects the difference between the resources used in India for current investment and consumption on one hand, and on the other hand, the value of current output, the inflow of foreign capital and the draft on reserves at the rate considered safe.

6. Dr. Patel's analysis of the foreign-trade experience of India is an example of economics without prices and costs; it thus disregards major determinants of the volume and value of Indian exports. His approach to the problem of long-term forecasting is similar. Throughout the discussion, prices, costs, exchange rates and the level of internal demand are disregarded. This is an instance of the tendency in current literature on under-developed countries to attempt to make long-term forecasts of the unknown future, while simultaneously ignoring the essentially relevant factors which are amenable to economic analysis.

7. Neither in developed nor in under-developed economies is there particular merit in directing resources towards exporting or import saving, instead of simply trying to ensure that they be deployed to make the largest

[1] In India deficit finance refers to the excess of government spending over receipts from taxation, loans from the public and drafts on government reserves. It refers to a government deficit financed by the creation of money, and not simply to a budgetary deficit.

[2] Explanations different from that presented in the text have been advanced for the recent Indian exchange crisis, notably that it resulted from bad harvests or a deterioration in the terms of trade. But even if these explanations are valid (which is doubtful), it would still be inappropriate to ascribe the sudden payments deficit since 1956 to such long-term factors as a long-period stagnation or decline in export demand.

contribution to output, present or future. The distinction between activities yielding or saving foreign exchange and other activities becomes material only if the national currency is over-valued in the sense that the foreign exchange earned or saved, expressed in local currency, under-states the contribution of these resources to the flow of income. In the absence of an over-valuation of the exchange rate in this sense, any increase in the national output makes the same contribution to available goods and services, regardless of destination. Thus it follows that the capacity to export or to import does not set up obstacles to development distinct from those stemming from the limited capacity to produce.

8. The concept of a saturated demand for exports, as often found in the current literature on under-developed countries, is not clear. If it refers to a price elasticity of demand of less than unity, it would imply a situation in which a country could increase its export earnings by reducing export supplies, and thereby, incidentally, also saving resources. Clearly this is not what is envisaged; nor is such a situation likely to be practically important.[1] Another possible interpretation is a low-income elasticity of demand. Again, the practical importance of this type of situation is doubtful; this is at least partly suggested by changes in international demand between more and less prosperous years. But even where such a situation exists, the situation itself does not represent an additional or peculiar barrier to economic growth, that is, a barrier distinct from or additional to that implicit in a low productivity of resources in the economy. The situation would be analogous to that in a closed economy with resources yielding diminishing value returns in particular employments.[2] The value productivity in turn depends on physical returns and on their values, whether these are set by the government or by the market. It is the value-productivity (present and future) of the resources which matters, regardless of where their output is marketed.

9. There is also no empirical or logical foundation for the suggestion that developing under-developed countries necessarily find themselves in chronic balance-of-payments difficulties; and indeed that the absence of such difficulties in an under-developed country is evidence that the country (or rather its government) is not sufficiently energetic in its efforts to promote material progress. Whatever its political or ideological basis, there is no support for this view either in the earlier history of developed countries or in the recent

[1] There is a class of exports from some under-developed countries for which the demand may at a certain point become perfectly inelastic, namely, simple manufactures on which quotas are apt to be imposed when the volume of imports becomes large. While in certain conditions this may well be practically important and relevant to the framing of trade policy, it does not apply to the major exports of most under-developed countries, nor does it affect the analytical argument of the text.

[2] If the income elasticity of foreign demand is negative, and the long-term decline in demand is not offset by an increase in domestic demand, excess capacity may develop in the industries in question. This may raise problems when the resources are specific. But they are no different from those created by changes in domestic demand.

history of many under-developed countries which have advanced rapidly in the last few decades. Chronic balance-of-payments difficulties accompany economic development (with or without formal development planning) only in the conditions set out in paragraph 5 above, that is if the money demand for resources for consumption and investment exceeds the value of current output, the inflow of foreign capital and the draft on reserves at an acceptable rate. Such a situation is clearly not a necessary or general corollary of economic development, even of rapid development. In both developed and under-developed countries rapid development can take place, and has often taken place, without these conditions; and conversely, these conditions can arise, and have often arisen, both in highly developed countries and in more or less stationary under-developed countries.

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REJOINDER TO COMMENTS ON "EXPORT PROSPECTS AND ECONOMIC GROWTH: INDIA"

THE observations made by Dr. A. Krueger and Professor P. T. Bauer on my study "Export Prospects and Economic Growth: India" (ECONOMIC JOURNAL, September 1959) centre around the theme that the policies of the Government of India are much more to blame for the stagnation of India's exports than the slow-expanding import demand of the industrial countries for primary products of agricultural origin.

1. The continued stagnation of exports is accepted by Dr. A. Krueger as "correct in total," but she is not at all surprised at this, since according to her India's economy was also "stagnant . . . static" in this period. Because *per capita* income in India did not change much, Dr. Krueger seems to have implied that the total volume of output was also stagnant. Even on the assumption of a constant *per capita* income, the volume of total national income for the part that now constitutes India must have increased over these three decades, as did population, by about one-half. Stagnation—in fact a decline—in the volume of exports against this background means that they fell from about 9% of the output in the 'twenties to only 6% in the 'fifties. The capacity to produce obviously expanded much faster than that to export.

2. It was suggested in my study that the relative stagnation of Indian exports stemmed from a major shift in the commodity structure of world trade and from the limited expansion of imports of agricultural primary products into the industrial countries. The G.A.T.T. and the various regional Commissions of the United Nations have also advanced similar conclusions on the basis of extensive research on the export experience of various countries. Dr. Krueger and Professor Bauer do not seem to agree

with the main lines of these analyses and maintain that "the past behaviour of Indian exports can be more than adequately explained by the policies of the Government of India and the Planning Commission, combined with internal demand and supply factors within India" (Krueger). Those who would expect that after such an announcement there would be an effort at explanation of the past behaviour of Indian exports would be seriously disappointed at what follows.

Dr. Krueger blames the Planning Commission for "neglecting investment in export industries," but one is left wondering how such neglect—even if such neglect can be shown (which it is not) to exist—can now explain the *past* behaviour of exports. As an "additional support" to her thesis, she refers to the Indian balance of payments on private account being in approximate balance and blames the Government "for huge increases in import level for Government purchases without attempting any simultaneous measures of export promotion." Surely *export* stagnation of such long-standing is not be be explained by extremely heavy *imports* on Government account in recent years! As the final proof, she cites the fear of the Planning Commission that the supply of exportable goods, particularly cotton textiles, may fall off considerably with rising domestic demand. That the fears of the Planning Commission were not well-grounded is obvious from the fact that in the last three years cotton textile output barely increased at all owing to the limitations of both domestic and foreign demand and the industry worked with substantial excess capacity. Contemporary concerns seem to have weighed so heavily on Dr. Krueger that the longer-term significance of my findings was totally neglected.

3. In paragraphs 3 and 4 of his note, Professor Bauer carried the ball forward from Dr. Krueger and, besides other charges, deplored my not supplying "information on the share of Indian exports in world exports of particular commodities." This was regarded as crucial because "if this share had increased in a constant or declining total volume of world exports, this would more nearly support his [Patel's] thesis. In fact this information has not been produced. The actual development has been the opposite; there has been an increase in the volume of world exports of these commodities with a decline in India's share." This long quotation would not have been cited were it not a classic example of indifference to evidence.

The needed information could have been easily derived from text-tables on pp. 495–6 of my study even without the use of a slide-rule. If this simple arithmetical exercise had been undertaken by Professor Bauer it would have saved him the unfounded assertion concerning decline in India's relative share. Of the four major commodities dealt with in the study, India's share has increased in the case of tea and cotton textiles; whereas jute manufactures form a near-monopoly, and exports of ground-nuts and oil are of marginal significance, amounting to only 2% of total exports.

4. Dr. Krueger regards my estimates of export prospects as "pessimis-

tic." The Indian Government and the scholars in the field would have been grateful indeed if she had presented the major elements on which a non-pessimistic forecast could be built. Instead, she broadly agrees with my estimate of jute exports. She finds "much evidence" for several alternative hypotheses for "demand for tea," although not a word can be found to show whether she expects demand for tea to rise over the next two decades by 15–20% as I had suggested, or more than that. Similarly, even a simple question such as "will the cotton-textile exports rise or fall in the future?" (let alone precise indication of by how much) cannot be answered with any degree of certainty from her text. These three commodity groups make up more than one-half of India's exports, and Dr. Krueger has nothing to say about the others. Is this the way to prescribe optimistic perspectives to India?

5. The final section by Dr. Krueger and paragraphs 7–9 by Professor Bauer deal with the implications of my analysis. The role of deficit finance and larger imports by the public sector are for them the villains of the piece for the recent foreign-exchange crisis. In their haste to chase the culprits, it was simply overlooked that my study had nothing to do with explaining the recent foreign-exchange crisis; nor did I once refer to "deficit finance" in the entire text of my study. Professor Bauer advances the general formula for balance in the economy. He appears to think that once you do away with deficit finance, a large measure of the troubles will be over. A theorist's fascination for general formulæ has much to commend itself. But can these generalised formulæ be used to suggest that if two countries (say, India, with difficulties in raising exports, and Venezuela or Iraq, which do not face such difficulties in petroleum exports) were to finance their investments without resorting to any deficit finance, there would be no serious difference in the growth of their ability to import capital goods to carry out the rising investment programme? The factors that create external and internal disequilibrium need to be separated. In fact, even if there is no creation of extra money and if the rising investment level is financed by a vigorous mobilisation of domestic savings, there is no reason to suggest that there will necessarily be a balance on the external account. In the conditions of internal equilibrium in the context of rising investment (broadly speaking a necessary condition for economic growth in most of the under-developed areas), there will generally be pressures on the external account unless external finance, available through exports, service transactions and capital imports, is also increasing in line with investment. External balance could of course be maintained by reducing the rate of growth of investment and of the economy; but there the prime objective would have to be external balance rather than satisfactory economic growth.

6. My analysis of investment and foreign-trade implications related to a specific case: of a country whose exports form a small and falling proportion of national output and whose investments will have to be a rising propor-

tion of national output if a satisfactory pace of economic growth is to be maintained.[1] It was in this context that I had tried to elucidate the conditions of external balance and the requirements of economic growth. It was suggested that many under-developed countries are in a not altogether dissimilar situation and the analysis will have relevance to them. Such countries appear to account for a large majority of the population of the economically less-developed countries of the world. Neither of my critics appear to have appreciated the need for an analysis of particular situations. But then, what can one do with a general statement if the whole is one vast exception?

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HARROD ON DOMAR'S THEORY OF GROWTH[2]

SIR ROY HARROD has done his theory of growth a little less than justice by not pointing out the dissimilarities between his concept of the "natural" rate of growth and Professor Domar's $\alpha\sigma$ rate of growth.[3] Because, as will be shown below, it is the difference between these two basic concepts which leads to a relatively greater applicability of his own theory. He is quite correct so far as the identity of his "warranted" rate and Domar's αs rate of growth is concerned. But the very acceptance of the identity of the latter two concepts makes it difficult to accept the similarity of the former two. This, for the simple reason that while Domar's $\alpha\sigma$ can never be greater than his αs,[4] Harrod envisages the possibility of his natural rate being sometimes higher and sometimes lower than his warranted rate. This would not be possible if Harrod's natural and warranted were respectively identical with Domar's $\alpha\sigma$ and αs rates. What is the basis of this difference?

Although Harrod has not always made it quite explicit, his natural rate of growth would keep all labour fully employed at the appropriate

[1] Professor Bauer refers to the absence of balance-of-payments difficulties in "the early history" of developed countries or in "the recent history" of rapidly developing countries (paragraph 9). But it is not mentioned that in nearly all these cases, exports formed a high and rising share of national output; investment, even when rising, usually formed a lower proportion of output than exports. These elements are fundamentally different now in India and many of the under-developed countries.

[2] I should thank Mr. Cliff Lloyd for his help in writing this note. The responsibility for the views expressed is, of course, entirely mine.

[3] "Domar on Dynamic Economics," ECONOMIC JOURNAL, September 1959, pp. 455–6. See also E. D. Domar, *Essays in the Theory of Economic Growth*, Essay Nos. III and IV; and R. F. Harrod, *Economic Essays*, Essay No. 13, and *Towards a Dynamic Economics*.

[4] The possibility of an exception is mentioned, but formally discarded by Domar in Note 11 of his Essay No. III, *op. cit.* In any case an exception, along the line suggested there, would not be relevant for our purposes, as would become clear from the following discussion.

capital/output ratio.[1] As we are concerned here with rather basic differences, we shall make the discussion simpler by assuming that capital and labour are the only two "economic" factors, that the coefficient of production is fixed, and that no technological improvements take place or have taken place in the relevant period. It must be added that there is no contradiction between these assumptions and those made by Harrod or Domar. In fact, our case may be considered a special case of theirs. On these assumptions the natural rate of growth would equal the rate of growth of the labour force, irrespective of whether it is higher or lower than the warranted rate, which is simply the rate of growth of income which would absorb all the savings for investment purposes, and which, in our case, would equal the rate of growth of capital. Domar's $\alpha\sigma$, on the same assumptions, would equal the rate of growth of the labour force only for the case when that rate is lower than the rate of growth of capital, but it would equal the rate of growth of capital when this is lower than the rate of growth of the labour force. Thus part of the time Domar's $\alpha\sigma$ equals Harrod's natural rate of growth, while the rest of the time it equals Harrod's warranted rate, *i.e.*, when it equals Domar's own αs.

Domar's prescription for the well-being of the economy seems to be that the actual rate of growth should equal $\alpha\sigma$. Harrod has rightly pointed out [2] that in the case of $\alpha\sigma$ being lower than αs excessive junking may result, even when income happens to grow at the rate of $\alpha\sigma$. Thus this rate may not be maintained even if it is attained, because the junking required for maintaining it may not be profitable.[3] On the other hand, if such junking is somehow forced on the economy it can neither be claimed that the capital is being ideally utilised nor that the economy is growing with its own momentum. To retrieve the situation, Harrod seems to suggest that Domar's requirement should be altered to read that the actual rate of growth should equal $\alpha\sigma$, which in turn should equal αs. But this still is an answer to only a part of the problem. If the size of the labour force is increasing at a faster rate than the stock of capital there would still be "Marxian" unemployment [4] and/or periodic inflations [5] in the economy in spite of all the modified Domar conditions being fulfilled. On the other hand, Harrod's own conditions that the actual rate of growth equals

[1] For example, "G_n (n for natural) is the rate of advance which the increase of population and technological improvements allow," *Towards a Dynamic Economics*, p. 87; or "It is the natural rate that implies full employment," ECONOMIC JOURNAL, September 1959, p. 455.

[2] *Op. cit.*

[3] Thus if the fixed coefficient of production implies that the equipments are of constant efficiency type (cf. F. and V. Lutz, *The Theory of Investment of the Firm*, p. 101), then, on our assumptions, no net junking can be profitably made at a positive rate of interest.

[4] As pointed out by D. Hamberg "Full Capacity Growth *vs.* Full Employment Growth," *Quarterly Journal of Economics*, August 1952. Hamberg calls it Marxian unemployment, but "Malthusian" seems to be a more appropriate adjective, as it is the case of population outstripping resources. Malthus' own ideas about unemployment were, of course, quite different.

[5] Harrod, *Towards a Dynamic Economics*, pp. 87–90.

the warranted rate of growth, which in turn equals the natural rate (with the rider that the economy is initially at the full-employment level), excludes the possibility of excessive junking as well as of Marxian unemployment or inflation. To translate these conditions for an "ideal" rate of growth in Domar's language would be impossible without adding a few more concepts to his vocabulary. Sir Roy Harrod appears to have succeeded in this only because he overlooks the difference between his natural rate of growth and Domar's $\alpha\sigma$.

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CURRENT TOPICS

THIS issue of the ECONOMIC JOURNAL, to the great regret of the Council of the Society and of all Fellows, is the last which will appear under the editorship of Sir Roy Harrod. He has asked the Council to release him from the heavy load that he has carried ever since he first became Joint Editor in 1945. Under Sir Roy Harrod's editorship the ECONOMIC JOURNAL has fully maintained the great reputation that it had achieved during the thirty-four years that Maynard Keynes held office. Few editors can have succeeded to a more difficult task. During his tenure the responsibilities of an editor have changed greatly in magnitude and in character. The vast expansion of academic economic studies all over the world has multiplied out of all knowledge the volume and quality of material submitted to any journal. The increasing output of mathematical and econometric articles has imposed much more difficult tasks of judgment on an editor. In a world of increasing specialisation an editor needs to possess an omniscience that few can command. All these difficulties Sir Roy Harrod has surmounted with rare distinction. The Council has appointed in his place Professor Charles Carter of the University of Manchester. He will share with Professor Austin Robinson and Mr. Robin Matthews the responsibilities of editorship. The editorial office will continue to be at The Marshall Library, Downing Street, Cambridge.

JOHN FLINT CAHAN, who was killed in a motor accident near Marlborough on February 3, had recently been appointed Associate Director of the newly founded Overseas Development Institute. His death is a heavy blow to the Institute at a critical moment in its expansion. Flint Cahan, born and educated in Canada as an engineer, came first to economics at University College, London. Appointed in 1938 as one of the original staff of the National Institute of Economic and Social Research, he moved with all his colleagues into the Ministry of Economic Warfare at the outbreak of war. After twelve years spent mostly as a British Civil Servant, he joined the

O.E.E.C. in Paris in 1951 and rose five years later to be Deputy Secretary-General. In that office he took a large share in the freeing of trade and payments and showed immense capacities in securing agreement between nations, large and small, with different outlooks and interests. His great concern for the small and underdeveloped nations made him glad to accept his new post in the Overseas Development Institute, where he had hoped to find wide scope for his interests and gifts in a field very near to his heart.

C. F. BICKERDIKE, who died on February 3, was almost unknown to the younger generation of economists, but played a considerable part in the Free Trade controversies in the early years of this century. Educated at Oxford under Edgeworth, he taught for a time at Manchester. His life's work was, however, in the Board of Trade and later in the Ministry of Labour, first as Registrar and then as Umpire in relation to Unemployment Insurance. In his earlier years he contributed a number of articles of interest and importance to the ECONOMIC JOURNAL.

A Supplement to Bonar's *Catalogue of the Library of Adam Smith* is being prepared under the auspices of the Royal Economic Society. The supplement will include all the additions which have from time to time appeared in the ECONOMIC JOURNAL and in other periodicals since 1932; the additional items sketchily listed in the MS. catalogue prepared for Adam Smith in 1781 now in possession of the University of Tokyo, which has been edited by Professor Yanaihara; and the numerous additions and corrections that have been the fruit of the researches of Mr. Mizuta, who has undertaken the compilation of the Supplement. It is also hoped, however, that this may be the occasion for bringing to light other items that have so far escaped notice. This is an appeal for the help of librarians, private owners and others who may know of the location of books, not hitherto reported, which bear the book-plate of Adam Smith. Information of such items, with a brief description on the lines of Bonar's *Catalogue*, may be addressed to THE SECRETARY, Royal Economic Society, The Marshall Library, Downing Street, Cambridge. An acknowledgment of contributions will be made in the Supplement.

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VOL. XXVIII, NO. 109, FEBRUARY 1961. *Theories of Consumer's Behaviour: A Cynical View:* E. J. MISHAN. *Approaches to Stability Analysis:* P. NEWMAN. *Seven Centuries of Wages and Prices: Some Earlier Estimates:* E. H. PHELPS BROWN and S. V. HOPKINS. *Liquidity Preference and the Multiplier:* R. C. O. MATTHEWS. *Sir James Steuart and the "Aspiration Effect":* R. V. EAGLY. *Country Size and the Terms of Trade:* G. L. REES. *Hayek on Liberty:* LORD ROBBINS.

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No. 10, 1960. *For Strong Financial and State Discipline:* K. Lazarov. *The Problem of Gold in the Capitalist System Since the Second World War:* D. Poryazov. *For a Correct Use of Working Capital in State Farms:* D. Yanev and K. Radkov. *The Situation and Development of Co-operative Markets:* N. Lazarov. *The Progress of Stockbreeding and Long-term Credits for Co-operative Farms:* D. Sapundzhiev. *The State Savings Bank System and Its Role in Fulfilling and Overfulfilling the Plan for Savings:* S. Dimitrov. *For Improving Account Settlement between Enterprises:* D. Vasilev. *For a Further Strengthening of the Soviet Ruble:* K. Zanev. *The Opening of the Campaign Months for Savings:* K. V. *A Press Conference at the Ministry of Finance:* V. Otashliiski. *The Progress of Savings Deposits in Bulgaria during the Second and Third Five Year Plans:* K. V.

Ekonomski Pregled (Serbo-Croat text, some English summaries)

No. 11–12, 1960. *Ten Years of Workers' Self-Government:* V. Farkaš. *Business Enterprise and Distribution of Income:* D. Gorupić. *Current Development Trends in the Organic-Chemicals Industry:* M. Sekulić and K. Čaušević. *Some Problems of the Technical Training of Personnel:* D. Gorupić and A. Jaeger. *Planning and Sociology:* R. Bićanić. *The Development of Road Transport:* P. Dražić.

Economist (Serbo-Croat text, some English summaries)

No. 4, 1960. *An Outline of the Long-term Development of the Yugoslav Economy:* N. Čobeljić. *The Choice of Investments:* S. Popović. *Elements for the Determination of Some Specific Characteristics of Yugoslav Exports:* V. Pertot. *Fundamental Problems in Organising the Economic-Statistics Services:* G. Grdić. *Problems of Investment Statistics:* S. Popović. *The Price Index as a Deflator:* B. Babić, P. Krasulja and M. Draiković. *World Trade Prospects for Maize:* P. Mihailović and Lj. Komadinić. *On a Theoretical Problem of a Model of Expanded Reproduction:* V. Jovanović. *Some Comments on Ohlin's Conception of the Theory of International Trade:* Lj. Adamović. *A Consultation of Economists on the Economic System:* J. Radaković. *The VI Session of the Yugoslav Statistical Society:* B. Savić.

Közgazdasági Szemle (Hungarian text, English and Russian summaries)

No. 12, 1960. *Some Problems of Financing House Construction:* F. Kacsenyák. *The Effect of the Socialist Reorganisation of Agriculture on Money Circulation:* F. Gönczöl, E. Huszti and S. Tarpataki. *On the Concrete System of a Planned Economy:* A. Hegedüs. *The Efficiency of Exports and the Average Level of Productivity:* J. Fáy and É. Jónai. *Passenger Transport in Budapest:* L. Fébó. *The Long-range Development of the Rumanian Economy:* V. Rauner. *The Economics of Mechanising the Cultivation of Arable Crops on the Basis of the Experience of State Farms:* I. Voit. *A Co-operative Conference in Poland:* Z. Gerő.

No. 1, 1961. *Labour Productivity from the National Aspect and That of a Firm:* O. Pirityi. *The Illusion of the Family Farm and Western Reality:* E. Csizmadia. *Problems of the Elasticity of Demand:* I. Varga. *Labour Intensity and Economic Efficiency:* K. Facsády. *The Level of Hungarian Industrial Development in Comparison with European Levels in the Period up to the Second World War:* I. Berend and Gy. Ránki. *On the Economic Significance of Irrigation with Bored Wells:* M. Lovas. *Economic Problems in the United States:* A. Rába. *Problems of the Development of Economically Underdeveloped Countries:* J. Szita. *Some Problems of the Long-range Planning of the Standard of Living:* E. Jávorka and Á. Schmidt. *The Discussion of R. Nyer's Book on Co-operatives in Hungary:* L. Kiss. *The Second International Conference of Agricultural Economics Research Institutes:* Cs., F. and R.

No. 2, 1961. *The Theoretical Foundations of Regional Planning:* L. Köszegi. *The Socialist Price System and the Net Social Income:* I. Vincze. *Some Problems in the Planning of Services to the Population:* K. Burger. *The Elaboration of an Input–Output Table for International Comparison:* S. Ausch and A. Bródy. *On the Analysis of the Work of Research and Development Institutes:* J. Fáth. *Some Experiences in the Organisation of Large-scale State Farms:* E. Királyi. *On the Evaluation of Efficiency:* I. Zhukova. *Changes in the Pattern of Raw Material Production in Capitalist Countries:* A. Rédey. *The Past and Present of Japanese Foreign Trade:* K. Biró. *A Discussion on the International Division of Labour:* D. Sóky. *Some Problems of the Calculation of the Efficiency of Industrial Investments:* M. Gecse-Bogár.

Statisztikai Szemle (Hungarian text, quarterly English and Russian summaries)

December 1960. *In Memory of Charles Jordan:* I. Vincze. *Productivity Trends in Hungarian Industry:* Z. Román. *The Inverse Matrix of the 1957 Input–Output Table of the Hungarian Economy:* A. Rácz and L. Újlaki. *The Optimal Location of Agricultural Production:* J. Sebestyén. *The Demand for Ready-made Garments and Textile Piece Goods:* L. Gárdos and L. Kovacs. *Forty Years of the Journal "Statisticky obzor":* F. Gyulay.

Probleme Economice (Rumanian text, English, French and Russian summaries)

No. 10, 1960. *The Fifteenth Anniversary of the National Conference of the Rumanian Communist Party. On the Common Advance of the Socialist Countries towards Communism:* S. Pop. *The Nature and Characteristics of Commodity Production under Socialism:* M. Păraluță and V. Spiridon. *The Development of the Food Industry during 1960–65:* C. Teodoru. *Scope for Reducing Costs in Stockbreeding:* A. Popa, N. David and O. Popescu. *The Fascist Character of the Pseudo-theory of Mihail Manoilescu on International Economic Relations:* M. Horowitz. *The Scientific Groundlessness of the Keynesian Theory of the Reproduction of Social Capital and the National Income:* I. Anghel. *On the Situation and Tasks of Economic Research in the German Democratic Republic:* G. Manz. *The Scientific–Methodological Conference on Agricultural Economics in Prague.*

No. 11, 1960. *The 1961 State Plan—a Great Step Forward in Carrying Out the Six Year Plan. The Economy of the U.S.S.R. in All-out Construction of Communism:* A. Severin. *The Great October Socialist Revolution and the National Liberation Struggle in the Colonies and Dependent Countries:* Gh. Dolgu. *Current Problems of the Increase in the Production of Electric Power:* M. Bercovici. *Some Aspects of the Profitability of Production in the Socialist Economy:* Gh. Crețoiu. *The Use of Modern Techniques in Increasing Agricultural Outputs:* S. Hartia. *Agricultural Exports and the One-sided Development of the Agricultural of Bourgeois–Landlord Rumania:* O. Parpală. *The Myth of "People's Capitalism" and Reality:* G. Rodan. *The Foreign Trade of the U.S.S.R.—a Powerful Factor in International Economic Collaboration:* I. Burstein. *Improvement of the Utilisation of Materials at the Industria Sîrmii Works at Cîmpia Turzii:* A. Puiu.

Ekonomia Popullore (Albanian text)

No. 1, 1961. *Under the Marxist–Leninist Direction of Workers' Party, the Albanian People March with Assurance along the Road of Building Socialism. The Compete Clearance of Crops from the*

Fields Is the Key to Harvesting in Our Climate: S. Kolleka. *The State Budget for 1961—a Budget of Major Tasks:* Sh. Kruja. *The Raising of the Material and Cultural Level of Workers during the Third Five Year Plan:* A. Qyteti and F. Meksi. *The State and Prospects of Building Materials and Wood Industries:* A. Lipi. *The Development of State Farms during the Third Five Year Plan and the Strengthening of Their Role in Agriculture:* L. Koçibelli. *On Some Credit Problems:* J. Boshnjaku. *On the Calculations of the Mean Expectation of Life of Our People:* H. Bardhi. *The Economic Advantages which Manufacture of Silicate Bricks Will Afford:* V. Mullaraj.

NEW BOOKS

British

Benham (F.). Economic Aid to Underdeveloped Countries. London and New York: Oxford University Press for the Royal Institute of International Affairs, 1961. 7¼″. Pp. 121. 12*s.* 6*d.*

[To be reviewed.]

Clairemonte (F.). Economic Liberalism and Underdevelopment. London: Asia Publishing House, 1961. 9″. Pp. vi + 344. 40*s.*

[To be reviewed.]

The Communist International 1919–1943: Documents. Volume II, 1923–1928, selected and edited by Jane Degras. London: Oxford University Press for the Royal Institute of International Affairs, 1960. 9¼″. Pp. xiv + 584. 80*s.*

[This is a selection of documents, translated into English and accompanied by brief explanatory notes. The author has made use of the Trotsky archives and other unpublished material as well as documents published by the Comintern itself.]

Cox-George (N. A.). Finance and Development in West Africa. The Sierra Leone Experience. London: Dobson, 1961. 8½″. Pp. 333. 50*s.*

[To be reviewed.]

Economic Development for Latin America. Proceedings of a Conference held by the International Economic Association. Edited by H. S. Ellis and H. C. Wallich. London: Macmillan, 1961. 9″. Pp. x + 479. 45*s.*

[To be reviewed.]

Fearn (H.). An African Economy. A study of the economic development of the Nyanza Province of Kenya, 1903–1953. London: Oxford University Press for the East African Institute of Social Research, 1961. 9″. Pp. xviii + 284. 35*s.*

[To be reviewed.]

Fleck (Sir A.). Science and Industry: A Blend with Humanism. Fawley Foundation Lecture. Southampton: University of Southampton, 1960. 8½″. Pp. 19. 2*s.* 6*d.*

[" While our technical capacity to produce better and more sophisticated materials and goods is rapidly increasing, the ability of the generality of our people to understand the philosophy of our industrial and scientific operations has advanced not at all." To meet this challenge, Sir Alexander Fleck first finds an encouraging precedent in the Mond–Turner conference of 1927–30. However, the method which he spells out at greater length is the possibility that a Commission of university staff might try to work out an industrial code. Such a Commission, he suggests, might be able to work out a reasoned approach to problems such as the optimum length of the working week, redundancy and the proper place of research. Despite the attractions of this idea, economists, at least, are likely to feel some scepticism when Sir Alexander goes on to suggest that the Commission might be able to evolve acceptable general principles of the distribution of the product of industry between wages and profits.]

Franck (P. G.). The Economics of Competitive Coexistence. Afghanistan between East and West. London: Oxford University Press for the National Planning Association, 1961. 9″. Pp. xv + 85. 16*s.*

[Afghanistan is a country where competition between the Soviet bloc and the West in the granting of economic aid takes a particularly clear-cut form. Mr. Franck, who was at one time an

economic adviser to the Government of Afghanistan, begins by describing the general economic and political background of the country, and then goes on to provide a narrative of trade relations and aid programmes since the War. The amount of aid received from Russia has been larger than that from the West, though not enormously so. The two sources of aid have turned out to be to some extent complementary, with the Americans concentrating on long-term programmes in agriculture and education and the Russians on capital installations. Mr. Franck provides a careful appraisal of the economic significance of the various forms of aid that have been given, but his discussion of policy problems is focused mainly on political implications rather than on what is most in the interest of the country's economy.]

GILL (A. H.). The Second-hand Farm Machinery Market. Present-day Trading Conditions. Reading: Department of Agricultural Economics, University of Reading, 1960. 9½". Pp. 39. 5*s*.

[A description is given of the structure of the market, including some interesting particulars on collusive practices amongst dealers. The greater part of the trade is, however, conducted not by dealers but by distributors, who acquire second-hand machinery on a trade-in basis. Amongst distributors there does not appear to be much collusion. The present state of the market is a depressed one, and the author considers various proposals for improving it.]

HILTON (G. W.). The Truck System, Including a History of the British Truck Acts, 1465–1960. Cambridge: Heffer, 1960. 8½". Pp. ix + 166. 21*s*.

[This is an interesting monograph with the distinctive Chicago imprint (it was originally a Chicago Ph.D. thesis). The first part describes the way the truck system worked, with special reference to two British industries, nail-making and coal-mining, in the nineteenth century. The second part consists of a detailed history of the Truck Acts and the way they worked. This arrangement of the material is not very satisfactory, because the second part contains a good deal of information about how the system worked in industries not discussed in the first part, and this information has a bearing on the interpretation to be placed on the system as a whole. But the book is a short one, so it is not too difficult for the reader to do his own rearrangement. The theoretical problem posed is why employers adopted this way of reducing real earnings instead of simply cutting wage-rates. The author finds most support for the Webbs' hypothesis, that it was a way of circumventing agreed standard wage-rates. A convincing case is put, but Professor Hilton's evidence suggests that these standard wage-rates were by no means always the result of collective bargaining, as he seems to imply—was there a trade union among the rural knitters of Cornwall or of County Donegal (p. 146)? Often wage-rates seem to have been settled unilaterally by employers' associations, and the question why this should have been done therefore deserves some further exploration. The author is perhaps inclined to lean too heavily in his analysis on equilibrium theory and to underrate the role of frictions and conventions. In many, if not most, of the industries concerned, the bargaining power of labour was very weak, usually because of declining demand, and the standard rate may perhaps have represented the point below which the better employers agreed not to go in pushing labour's earnings down towards the minimum supply price.]

ISARD (W.). Methods of Regional Analysis. An Introduction to Regional Science. London and New York: John Wiley, 1960. 9". Pp. xxvi + 784. 76*s*.

[To be reviewed.]

KENDALL (M. G.). New Prospects in Economic Analysis. (Stamp Memorial Lecture 1960.) London: University of London, The Athlone Press (Canada: University of Toronto Press, Toronto 5; U.S.A.: Oxford University Press Inc., New York), 1960. 8½". Pp. 26. 2*s*. 6*d*.

[In this challenging lecture Professor Kendall argues that the study of economics as a quantified, scientific subject is only now beginning. The traditional forms of economic thinking are not adequate for the analysis of systems so complex as the economies we live in. Vastly greater amounts of statistical material are now available than there used to be, and modern computing methods enable them to be handled in ways which were formerly quite impossible. For the first time, therefore, the establishment of quantitatively specific models of the way the economy works is within our reach. Professor Kendall acknowledges that scepticism may reasonably be felt about the prospects of reducing the economy satisfactorily to a model of this sort, but he maintains that we should at least try, and that we can in any case hardly do worse than the unscientific intuitive methods of the past.]

KEYNES (J. M.). Essays in Biography. London: Heinemann (Mercury Books), 1961. 7". Pp. vii + 354. 7*s*. 6*d*.

[It is good to have these famous essays available in paper-back form. To the book as originally published have been added three later essays by Keynes in the same genre, on Jevons, on Newton and on Mary Marshall.]

LATOUCHE (R.). The Birth of Western Economy. Economic Aspects of the Dark Ages. London: Methuen, 1961. 9". Pp. xviii + 341. 36*s*.

[To be reviewed.]

LAYTON (E.). Building by Local Authorities. The Report of an Inquiry by the Royal Institute of Public Administration. London: Allen & Unwin, 1961. 9". Pp. 376. 40*s*.

[To be reviewed.]

LUARD (E.). Britain and Europe. London: Fabian International Bureau (11 Dartmouth St., London, S.W.1.), 1961. 8½". Pp. 24. 2*s*. 8*d*.

[This pamphlet argues the case for British participation in E.E.C. The author examines the various economic objections and finds none of them insuperable. He believes that the real objections have been political. Mr. Luard is a Research Fellow of St. Antony's College, Oxford.]

MORGAN (W.). Survey of Capital and Credit in Agricultural Co-operative Societies in Great Britain. Oxford: Basil Blackwell, 1960. 8½". Pp. xii + 143.

[Agricultural co-operatives are estimated to handle about 13% of farmers' trade in feeding-stuffs, fertilisers, machinery and fuel in this country. They also handle a large proportion of sales of eggs and a smaller proportion of the sales of other products. The first part of this study describes the sources of capital and credit to the societies viewed generally. The second part provides a group of case-studies on the financing problems of particular societies. The author argues that ploughed-back surpluses on operations must remain the chief source of permanent capital. But societies have great seasonal fluctuations in their need for finance, and the sources of short-term finance are not entirely satisfactory. It is suggested that arrangements might be made for the establishment of a central pool of funds to be drawn on for this purpose, since the peak-periods of finance needs for the different societies do not all coincide.]

SARGANT FLORENCE (P.). The Logic of British and American Industry. A Realistic Analysis of Economic Structure and Government. Second Edition, revised. London: Routledge & Kegan Paul, 1961. 9". Pp. xxii + 368. 30*s*.

[The first edition of this book appeared in 1953 and was reviewed in the ECONOMIC JOURNAL of June 1954 by L. Rostas. Professor Sargant Florence has for this edition added a long new preface and made a number of alterations in the text to bring it up-to-date. The most important of these alterations come in the first chapter and involve data on plant size.]

SARGANT FLORENCE (P.). Ownership, Control and Success of Large Companies. An analysis of English industrial structure and policy, 1936–1951. London: Sweet & Maxwell, 1961. 9½". Pp. xiv + 279. 63*s*.

[To be reviewed.]

SAYERS (R. S.). Modern Banking. Fifth Edition. London: Oxford University Press, 1960. 9". Pp. viii + 294. 25*s*.

[To be reviewed.]

SPEIGHT (H.). Economics. The Science of Prices and Incomes. London: Methuen, 1961. 9". Pp. 671. 42*s*.

[To be reviewed.]

WILSON (J. S. G.). Economic Environment and Development Programmes. Hull: University of Hull, 1960. 8½". Pp. 20. 2*s*. 6*d*.

[To illustrate his theme of the influence of economic environment on the nature of the development problem, Professor Wilson chooses three countries with very different conditions: The New Hebrides, India and Australia. To many readers the most interesting part of his lecture will be that dealing with the primitive copra-producing economy of the New Hebrides. Professor Wilson argues that the New Hebrides and Australia should both be regarded as suffering from a shortage of labour or under-population. The trouble in the New Hebrides, as he explains it, is largely the leisure-preference of the inhabitants, and the country is under-populated in the sense that, if inducements were offered which increased the effective supply of labour-effort, the standard of living would be raised. This would therefore appear to be a different sense of the concept of labour shortage from the sense in which it is held to be applicable to Australia, which Professor Wilson states in the usual terms of unexploited economies of scale.]

Canadian

REUBER (G. L.). Britain's Export Trade with Canada. Canadian Studies in Economics 12. Toronto: Toronto University Press (London: Oxford University Press), 1961. 10″. Pp. xii + 147. 28*s*.

[To be reviewed.]

Hong Kong

GETHYN DAVIES (S.). (Ed). Central Banking in South and East Asia. Hong Kong: The University Press (London: Oxford University Press), 1961. 9″. Pp. xi + 194. 27*s*. 6*d*.

[To be reviewed.]

West Indian

CUMPER (G. E.). (Ed.). The Economy of the West Indies. Kingston, Jamaica: Institute of Social and Economic Research, University College of the West Indies, 1960. 8½″. Pp. 273.

[To be reviewed.]

SMITH (M. G.), AUGIER (R.) and NETTLEFORD (R.). The Ras Tafari Movement in Kingston, Jamaica. Kingston, Jamaica: Institute of Social and Economic Research, University College of the West Indies, 1960. 9½″. Pp. 54.

[This is an interesting study by three members of the staff of the University College of the West Indies of a religious movement that has a strong hold amongst the poorest classes in parts of Jamaica. The two central tenets of the movement are that Haile Selassie is God and that the spiritual and material well-being of Negroes in Jamaica is to be achieved by remigration to Ethiopia (this term being used more or less synonymously with Africa). The Ras Tafarians do not enjoy a good reputation amongst the general public in Jamaica and they have had a good deal of trouble with the police. The authors argue that, despite the infiltration of some criminal elements, the Ras Tafarians are in general deeply religious and do not deserve persecution. Many of their attitudes, in particular their dream of return to a promised land, are traceable to unemployment. The authors argue that the authorities should be more sympathetic to them and should try to provide their longed-for migration to Africa if it turns out to be in any way practicable.]

American

AVRAMOVIC (D.) and GULHATI (R.). Debt Servicing Problems of Low-Income Countries, 1956–1958. Baltimore, Maryland: Johns Hopkins (London: Oxford University Press) for the International Bank for Reconstruction and Development, 1960. 8½″. Pp. xvii + 74. 20*s*.

[The period dealt with in this compact survey was one in which trends in world trade were unfavourable to most low-income countries. It is shown that, in contrast to former periods of recession, the inflow of capital continued, and this helped sustain the importing capacity of the debtor countries. At the same time the ratio of public debt service to external receipts rose. This was partly the result of the large repayments necessitated by the unbalanced composition of external debt between short-term and long-term commitments. The question is therefore raised whether a greater relative use of long-term borrowing would not in future be more realistic, in view of the borrowers' limited capacity to repay.]

BAKKEN (H. H.), GRAY (R. W.), HIERONYMUS (T. A.) and PAUL (A. B.). Futures Trading Seminar History and Development. Madison, Wisconsin: Mimir Publishers, Inc., 1960. 9″. Pp. xii + 283.

[This contains a group of papers by different authors on the working of the futures market and its importance for American agriculture. Both theoretical and practical aspects are considered, and the participants in the discussion included traders as well as academics.]

BOULDING (K. E.) and SPIVEY (W. A.). Linear Programming and the Theory of the Firm. New York: The Macmillan Company, 1961. 9½″. Pp. ix + 227. 42*s*.

[To be reviewed.]

BUCHANAN (J. M.). Fiscal Theory and Political Economy. Selected Essays. Chapel Hill, North Carolina: North Carolina University Press (London: Oxford University Press), 1961. 9″. Pp. 197. $5.00 or 40*s*.

[To be reviewed.]

BUTZ (D. E.) and BAKER (G. L.). The Changing Structure of the Meat Economy. Boston, Mass.: Harvard University Business School (London: Bailey Bros. & Swinfen), 1960. 8″. Pp. xix + 204. 25*s*. 6*d*.

[This book is addressed mainly to the managements of firms in the industry. The authors describe the present structure and organisation of the industry and the state of the market. They expect that production will tend to outstrip consumption and that there will therefore be a buyer's market. This is the basic problem of the industry, and it is largely independent of questions of marketing organisation. However, questions of organisation are also important and are accordingly discussed at length. A major development in recent years has been the growth in retailers' bargaining power. The authors discuss how far this and other trends are likely to continue in the future.]

COTTLE (S.) and WHITMAN (T.). Corporate Earning Power and Market Valuation, 1935–1955. Durham, North Carolina: Duke University Press (London: Cambridge University Press), 1959. 9¼″ (× 12¼″). Pp. 201. 94*s*.

[This is a collection and analysis of statistical information on a really large scale, with commentary and conclusions. The data relate to 151 companies, which between them account for 82% of the aggregate net worth of the industries from which they are selected. The main variables tabulated and studied are the following: profit margin per unit of turnover, capital turnover ratio, profit rate per unit of capital, earnings yield, pay-out rate, dividend yield and market-value to book-value ratio. These data are analysed by aggregates, by industry-groups, by industries and by individual companies. The period covered is 1935–55, and data are given for each year and for groups of years. Correlation analysis is applied to the relationships between the variables and also to the relationship between them and certain derivative variables, such as stability of earnings rates. The purpose of the work is to provide material to enable investors and managements to appraise on a comparative basis the performance and market valuations of companies within an industry and to evaluate one industry in relation to others.]

FIRESTONE (F. N.). Marginal Aspects of Management Practices. East Lansing, Michigan: Bureau of Business and Economic Research, Michigan State University, 1960. 9″. Pp. xii + 80.

[This is one of a group of studies coming from Michigan State University on the implications for economic theory of changing techniques of business management. It is based on two questionnaires. The main issues investigated were the degree of firms' responsiveness to market conditions in deciding on prices and products; the extent to which representatives of the selling, accounting and other sides participate in decision making; and the time element in budgeting. The author argues that his findings support the case for a marginalist approach to the theory of the firm.]

FRIEND (I.) and JONES (R.). (Ed.). Proceedings of the Conference on Consumption and Saving. 2 Volumes. Philadelphia, Pennsylvania: University of Pennsylvania, 1960. 9″. Pp. xxiv + 480; ii + 498.

[To be reviewed.]

GROSSMAN (G.). Soviet Statistics of Physical Output of Industrial Commodities, their Compilation and Quality. National Bureau of Economic Research. Princeton, New Jersey: Princeton University Press (London: Oxford University Press), 1960. 9¼″. Pp. 151. 36*s*.

[Reviewed in this issue.]

HANSEN (A. H.). Economic Issues of the 1960s. New York and London: McGraw-Hill, 1960. 9″. Pp. xv + 244. 43*s*.

[To be reviewed.]

HARRIS (S. E.). American Economic History. New York and London: McGraw-Hill, 1961. 9″. Pp. ix + 559. 62*s*.

[To be reviewed.]

HOSELITZ (B. F.). (Ed.). Theories of Economic Growth. Glencoe, Illinois: The Free Press, 1961. 9¼″. Pp. 344. $7.50.

[To be reviewed.]

KNOPF (K. A.) and STRAUSS (J. H.). (Ed.). The Teaching of Elementary Economics. (A Conference of College and University Teachers at the Merrill Center for Economics.) New York: Holt, Rinehart and Winston, 1960. 9½". Pp. xi + 296.

[To be reviewed.]

LEVIN (H. J.). Broadcast Regulation and Joint Ownership of Media. New York: New York University Press, 1960. 8½". Pp. xviii + 219. $4.50.

[This is a discussion of the case for separate ownership of broadcasting stations, on the one hand, and newspapers and other media, on the other. It is based on extensive research on the working of inter-media competition. The author supports the case for separation on the general grounds of fostering competition, and on the special non-economic grounds concerning freedom and variety of expression that apply in the communications industry.]

MARCUS (E. and M.). Investment and Development Possibilities in Tropical Africa. New York: Bookman, 1960. 8½". Pp. 286. $7.50.

[This is a general survey of Africa's economic problems, written at a semi-popular level, but with a great deal of factual detail. Attention is focused especially on the scope for investment, and the authors place particular emphasis on the possibilities of developing power supplies. The book is not very profound or original, but the authors have read widely as well as spending a year in Africa.]

MAUNDER (W. F.). Employment in an Underdeveloped Area. A Sample Survey of Kingston, Jamaica. New Haven, Connecticut: Yale University Press (London: Oxford University Press), 1960. 9". Pp. xiv + 215. 40*s*.

[The first part of this book considers the conceptual and practical difficulties involved in defining and measuring employment and unemployment in a country like Jamaica. The remainder gives the detailed results of a survey carried out in 1953–54. The topics on which data are provided include the following: participation rates by sex and age; distribution between occupational and industrial groups; educational standards and their association with present employment; earnings; and the incidence of sickness and of involuntary and voluntary employment among different classes of workers.]

MCKINNEY (G. W.). The Federal Reserve Discount Window: Administration in the Fifth District. New Brunswick, N.J.: Rutgers University Press, 1960. 8½". Pp. xi + 157. $4.50.

[The author was until recently an officer of the Richmond Federal Reserve Bank. The book describes the procedures and policies of the Federal Reserve Bank in granting discount facilities to member banks, and it is designed for the information of bankers as well as economists. The general policy, as described by Mr. McKinney, is that member banks should be allowed to borrow quite freely and without restriction to deal with temporary or unforeseen shortages of funds, so long as it is understood that it is not appropriate for them to become permanently indebted in such a way as in effect to be using the Federal Reserve Bank as a source of capital.]

MOORE (W. E.) and FELDMAN (A. S.). (Ed.). Labor Commitment and Social Change in Developing Areas. New York: Social Science Research Council (230 Park Avenue, New York 17), 1960. 9". Pp. xv + 378. $3.75.

["Commitment involves both performance and acceptance of the behaviours appropriate to an industrial way of life." In their long opening essay the two editors consider the general aspects of their concept as applied to the labour problems of a newly developing country. The essays which follow are grouped under four main headings: the organisation of work, the market matrix, competing status systems and changing social structures. Some of these contributions deal with particular aspects of the questions, some with particular regions, including studies of Puerto Rico, India, Uganda, Guatemala and French West Africa.]

NATIONAL INDUSTRIAL CONFERENCE BOARD. Problem-solving Conferences: How to Plan Them, How to Lead Them, How to Make Them Work. New York: National Industrial Conference Board (460 Park Avenue, New York 22), 1960. 11". Pp. 56.

[A "conference" is defined as a meeting of two or more individuals to pool their ideas for solving a problem. This report discusses the techniques for getting the best results from such meetings. It includes both analytical treatment of the general issues involved—aims and objectives, the relationship between participants, the role of the leader—and homely wisdom about practical details such as seating arrangements and the avoidance of irritating mannerisms.]

PERLOFF (H. S.), DUNN (E. S.), LAMPARD (E. E.) and MUTH (R. F.). Regions, Resources and Economic Growth. Baltimore, Maryland: Johns Hopkins (London: Oxford University Press), 1961. 10". Pp. xxv + 716. 96*s*.

[To be reviewed.]

PROUTS (R. W.). (Ed.). Essays in Economics and Econometrics. A Volume in Honor of Harold Hotelling. Chapel Hill, North Carolina: University of North Carolina Press for the School of Business Administration, University of North Carolina (London: Oxford University Press), 1961. 9½". Pp. xi + 240. 60*s*.

[This *Festschrift* includes contributions from some of the most distinguished American economists. The contents are as follows: Structure of a Minimum Equilibrium System: P. A. SAMUELSON. Decentralization and Computation in Resource Allocation: K. J. ARROW and L. HURWICZ. External Economies in Consumption: G. TINTNER. Hours of Work, Savings and the Utility Function: R. W. PROUTS. In Defense of Destabilizing Speculation: M. FRIEDMAN. The Influence of Interest Rates on Time Series of Price: H. T. DAVIES. Can Excises Lower Prices?: W. VICKREY. Modified Edgeworth Phenomena and the Nature of Related Commodities: C. E. FERGUSON. Market Prices vs. Factor Costs and the Constancy of Production Coefficients: R. FRISCH. The Efficiency of Estimation in Econometric Models: L. R. KLEIN. Bibliography of Harold Hotelling.]

RAY (D. D.). Accounting and Business Fluctuations. Gainesville, Florida: University of Florida Press, 1960. 9½". Pp. xii + 184. $6.50.

[To be reviewed.]

ROSENBERG (N.). Economic Planning in the British Building Industry 1945–49. Philadelphia, Pennsylvania: University of Pennsylvania Press (London: Oxford University Press), 1961. 8½". Pp. 159. 40*s*.

[To be reviewed.]

SAPIR (H. M.). Japan, China, and the West. The economics of competitive coexistence. Washington, D.C.: National Planning Association, 1959. 9". Pp. xi + 79. $2.00.

[This informative study is concerned with the problems of Japanese foreign economic policy viewed in relation to the conditions and prospect of the Japanese economy, on the one hand, and to the politics of competitive coexistence, on the other. The author reviews the present economic relations between Japan and Western countries, other underdeveloped countries and the Sino-Soviet bloc, and assesses the range of choice now open to the Japanese.]

SCHURR (S. H.) and NETSCHERT (B. C.). Energy in the American Economy 1850–1975. Baltimore, Maryland: Johns Hopkins Press (London: Oxford University Press), 1961. 10". Pp. xxii + 774. 100*s*.

[To be reviewed.]

SILK (L. S.). The Education of Businessmen. New York: Committee for Economic Development (711 Fifth Avenue, New York 22), 1960. 10". Pp. 44.

[This is a summary and survey of the findings of two recent reports on the teaching of business administration in American colleges, *Higher Education for Business*, by R. A. Gordon and J. E. Howell, and *The Education of American Businessmen*, by F. C. Pierson. The author in general endorses the severe criticisms made in these reports of business education as it is at present practised.]

SIRKIN (G.). Introduction to Macroeconomic Theory. Homewood, Illinois: Irwin, 1961. 9". Pp. xii + 252. $8.65.

[To be reviewed.]

STEPANEK (J. E.). Managers for Small Industry. An International Study. Glencoe, Illinois: The Free Press for the International Industrial Development Center, Stanford Research Institute, 1960. 9½". Pp. xvi + 245.

[This study is effectively divided into two parts. The first brings together information from a wide range of published sources on the position of managers in small-scale industry: their numbers, origins, characteristics, problems and opportunities. The second part consists of practical suggestions for the training of such managers, including detailed particulars of training schemes and courses in operation in a number of countries.]

STOLPER (W. F.). The Structure of the East German Economy. Cambridge, Mass.: Harvard University Press for the Center for International Studies, Massachusetts Institute of Technology (London: Oxford University Press), 1961. 9½". Pp. xxv + 478. 80*s*.

[To be reviewed.]

TOLLEY (G. S.) and RIGGS (F. E.). (Ed.). Economics of Watershed Planning. Ames, Iowa: Iowa State University Press, 1961. 9". Pp. ix + 339. $3.95.

[This contains the proceedings of a recent symposium on a subject that has been attracting an increasing amount of attention from American economists. The contributors come from many disciplines, including economics, agriculture, engineering and geology. Professor E. O. Heady and Robert Dorfman contribute papers on the use of mathematical analysis in watershed planning.]

Belgian

FRANK (M.). Analyse macroéconomique de la fiscalité belge, 1913–1958. Brussels: Département d'économie appliquée de l'Université libre de Bruxelles, 1960. 9½". Pp. 379.

[To be reviewed.]

Danish

KRISTENSEN (T.). The Economic World Balance. (Issued by the Foreign Policy Society.) Copenhagen: Ejnar Munksgaard (6 Norregade, Copenhagen), 1960. 9½". Pp. 377. Dan. kr. 46.

[This book can best be described as an ordered collection of statistics bearing on comparative development. In the opening chapters it is argued that the four factors in economic growth are population, capital, nature and culture. Chapters then follow on each of these factors. In each case comparative data are given up to the present day, together with projections up to 1980. A chapter on models of growth then brings these data together, and provides, amongst other things, tentative estimates of the coefficients in the Cobb–Douglas production function for each of the chief regions of the world. The appendix considers growth prospects region by region.]

Norwegian

JOHANSEN (L.). A Method for Separating the Effects of Capital Accumulation and Shifts in Production Functions upon Growth in Labour Productivity. Oslo: Oslo University Press for the Institute of Economics, University of Oslo, 1961. 12". Pp. 11.

[The method in question uses cross-section data and is designed so as to dispense with the need to use any measure of capital inputs. Unfortunately such drastic assumptions are needed that the margin of error involved seems likely to be at least as large as any that might be caused in other methods by faulty measures of capital. The assumptions include not only the usual ones—Cobb–Douglas production functions and distribution according to marginal productivity—but also an equal rate of change of capital–labour ratios in all industries and zero correlation between the rate of technical progress and the capital-elasticity of output.]

Austrian

Austria's Relationship to the Larger European Market. Vienna: Creditanstalt-Bankverein, 1959. 11½". Pp. 48.

[The main part of this report consists of a survey of the attitudes of leading Austrian industries and economic groups to the establishment of an integrated European market.]

Dutch

EIZENGA (W.). Contributions to Economic Analysis. Demographic Factors and Savings. Amsterdam: North-Holland Publishing Company (P.O. Box 103, Amsterdam), 1961. 8½". Pp. x + 107. 20*s*.

[To be reviewed.]

Swiss

HEILPERIN (M. A.). Studies in Economic Nationalism. Geneva and Paris: L'institut Universitaire de Hautes Études Internationales (Librairie E. Droz, 8 rue Verdaine, Geneva), 1960. 9½". Pp. 230.

[The main part of this book consists of a long essay on the development of the idea of economic nationalism, which this author traces from the mercantilists through Fichte to Lord Beveridge. Nationalism and collectivism are seen by Mr. Heilperin as closely associated ideas, and any notion

of national planning is tainted, because of the implied attempt to escape from the discipline imposed by free international contacts. It is on these grounds that Professor Meade's "liberal-socialist" solution is rejected. Appended to the main part of the book are reprints of a number of papers on related subjects published by the author in recent years.]

SUCHESTOW (M.). The Changed Structure. A Different Picture of the Monetary Economy. Winterthur: P. G. Keller, 1960. Pp. 174.

[On the occasions since 1945 when the Federal Reserve System has eased credit either by expanding the cash base or by reducing reserve ratios, member bank deposits have risen by considerably less than the full amount that the actions of the System made possible. Mr. Suchestow notes this fact and makes it the starting point for an attack on the whole theory of credit creation in a fractional reserve banking system. He claims that the powers of credit creation of any financial institution are limited to what he calls its "credit range"; for the commercial banks this is defined as the difference between their claims on other sectors (loans, securities and deposits with the Federal Reserve System) and liabilities to customers. Variations in this range are, of course, small, and the author therefore concludes that credit creation by the banking system has only an insignificant effect on the economy.]

Lebanese

BADRE (A. Y.) and SITSEK (S. G.). Manpower and Oil in Arab Countries. Beirut: American University of Beirut, Faculty of Arts and Sciences, 1960. 9". Pp. viii + 270.

[This is a study of the labour problems of the oil industry in Arab countries, viewed in relation to the problem of developing human resources generally in those countries. The authors provide much information on the building-up of the labour force, managerial organisation, the relations between labour and management, and the role of government. They believe that labour relations proper have, on the whole, been more successful than have developments on the managerial side, where efforts to introduce local personnel into the higher posts have often been half-hearted.]

Israel

PATINKIN (D.). The Israel Economy. The First Decade. Jerusalem: The Falk Project for Economic Research in Israel, 1960. 9½". Pp. 155. $2.00.

[To be reviewed.]

Egyptian

ASCHINGER (F.). Switzerland as a Financial Centre. Cairo: National Bank of Egypt, 1960. 9½". Pp. 25.

[Dr. Aschinger is Financial Editor of the *Neue Zürcher Zeitung*. In these lectures he gives an informative description of the leading Swiss financial institutions—the banks, the issue market, the stock exchanges and the gold and foreign-exchange markets. His lectures include some statistical information not previously available. One of the most interesting points that emerges is that the large degree of liquidity enjoyed by the Swiss banks makes them more or less immune from the conventional kinds of central bank control, and the central bank has had to rely on gentlemen's agreements. These have been faithfully observed. One of the main preoccupations of the authorities in recent years has been to prevent the inflow of foreign funds from disrupting the domestic money supply.]

Official

AMERICAN

Comparisons of the United States and Soviet Economies. Washington, D.C.: Central Intelligence Agency for the Subcommittee on Economic Statistics of the Joint Economic Committee Congress of the United States, 1960. 9". Pp. v + 50. $0.20.

[This report compares the benefits, both political and economic, derived by the United States and by the U.S.S.R. from their respective systems of alliances. It brings together a fair amount of information, but it is not a profound piece of work and does not contain any striking novelties either in its facts or in its conclusions.]

Industrial Production 1959 Revision. Washington, D.C.: Board of Governors of the Federal Reserve System, 1960. 10″. Pp. vi + 75 + 153 pp. of statistics.

[This describes an important revision of the Federal Reserve Board's index of industrial production. The index has been broadened to include output of electricity and gas, and many other refinements have been made. New groupings are also provided into market categories (equipment, materials, consumer goods) and sub-categories. The text describes the methods used and presents the most important results in the form of charts, accompanied by brief discussion of their economic significance. This is followed by some 150 pages of tables. The revision has been carried back to 1947. The revised index shows a higher rate of growth than the old one, the main difference coming in the period 1950–55.]

Review of the International Atomic Policies and Programs of the United States. Washington, D.C.: Joint Committee on Atomic Energy Congress of the United States, 1960. 9″. Pp. xi + 78. $0.35.

[The author of this Report is Robert McKinney. The Report provides much detailed information about policies and achievements in the peaceful uses of atomic energy, mainly with reference to the United States but with some discussion also of the experience of other countries. The author makes a number of suggestions about the reorientations of policy that are called for by the disappointingly slow progress made so far in bringing the cost of atom power down to the level where it would be competitive with conventional sources of energy. Volumes 2–5 of the Report contain background material.]

United States Information Service. The Economic Situation of Negroes in the United States. London: United States Information Service (American Embassy, London), 1960. 9½″. Pp. 39.

[The topics covered in this survey include population, employment status, occupation, income, employment policies, housing and education. The statistical information is presented clearly and interestingly.]

INTERNATIONAL

International Bank for Reconstruction and Development. The World Bank in Asia. Washington, D.C.: International Bank for Reconstruction and Development, 1960. 10″. Pp. 72.

[An informative brief country-by-country description of the World Bank's activities to date.]

United Nations. Special Study on Economic Conditions in Non-Self-Governing Territories. New York: United Nations, 1960. 11″. Pp. 42.

[This is part of a large continuing programme of United Nations publications on non-self-governing territories. The chief contents are three more or less separate chapters on the influence of the terms of trade, money and central banking systems, and the balance of payments with the metropolitan country. Each of these chapters provides a convenient brisk summary of the relevant statistical and other information for each of the main non-self-governing territories, and this descriptive material is then followed by discussion of the issues involved. Briefer chapters deal with productivity and with the transition from subsistence to market agriculture.]

United Nations Food and Agriculture Organisation. Yearbook of Fishery Statistics, 1958–9. International Trade. Rome: F.A.O., 1960. 12″. 17*s.* 6*d.*

United Nations Food and Agriculture Organisation. Yearbook of Fishery Statistics, 1959. Production. Rome: F.A.O., 1960. 12″. 20*s.*

[These yearbooks include statistics up to the end of 1959. The volume dealing with trade appears every other year, that dealing with production annually. The Editors state that having now published the production volume in its present form for five years, they are contemplating rearrangements, and would therefore welcome suggestions and criticisms from users.]

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